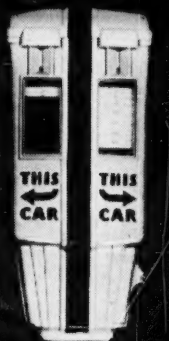
Products Finishing

CLEANING
PLATING
POLISHING
FINISHING

OCTOBER 1949



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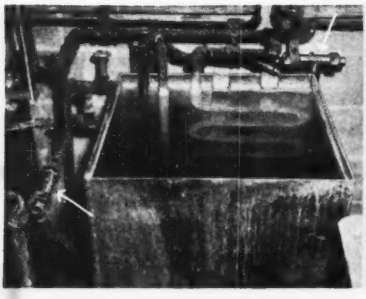

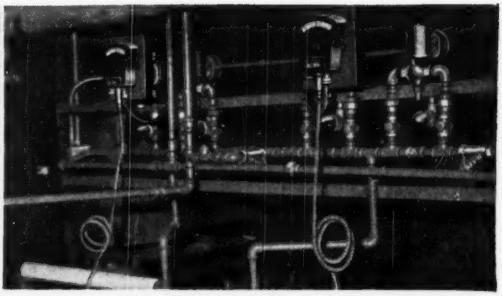

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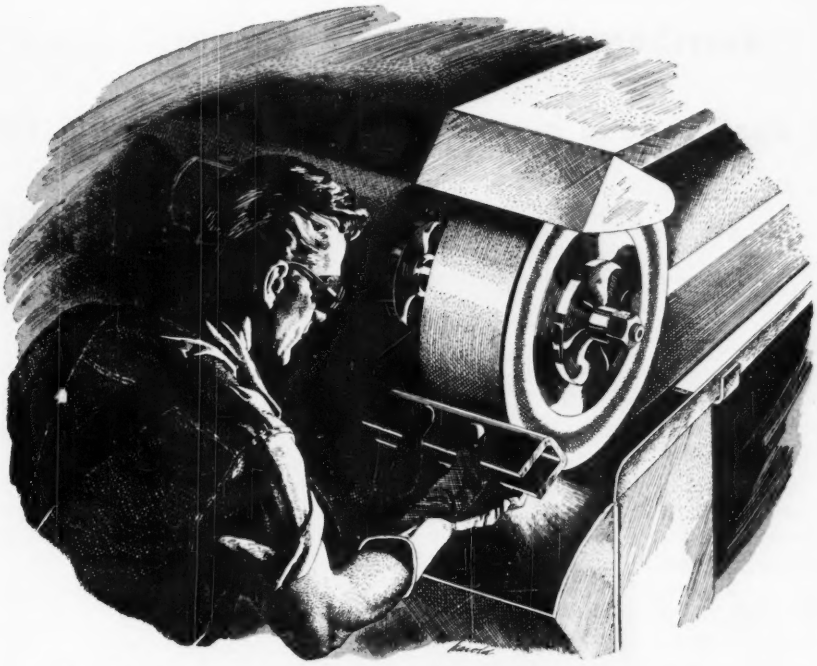

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In the above photo, operators are buffing fountain pens already filled with ink. Note redesigned hoods which keep room clean and free from dust.

Known as a manufacturer of precision writing instruments Eversharp finds "clean air, the invisible tool," essential to efficient manufacturing operations. On moving one of its plants to Middletown, Ohio, this concern called in KIRK & BLUM to modernize and enlarge the dust control system.

Among other changes, hoods on the buffing machine shown here were redesigned. Former bottom connections were used as traps and new connections were added at the top of the hoods. Note the compactness of hood arrangement and streamline suction piping in the limited space available.

Write for free catalog, "Fan Systems for Various Industries." The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati 25, Ohio.

On the roof of the Eversharp plant, KIRK & BLUM relocated an old collector for greater efficiency and installed this new collector.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM DUST CONTROL SYSTEMS

Pf editorial

October, 1949

Vol. 14, No. 1

Take a Look at Your Inspection Setup

Too often the Inspection Department and the individual inspectors are regarded as necessary evils which interfere with production schedules and scrap many parts that could have been sold. However, current conditions add value and importance to an inspection department, properly organized and properly manned.

The return of a buyer's market places increased emphasis on the appearance of the finished product. Further, in order that consumer confidence may be maintained, it is essential that the appearance of the finished product be maintained throughout a reasonable period of satisfactory service. Only a high-quality finish will fulfill these requirements. As the market becomes increasingly competitive, the cost of the product must be maintained or reduced. Usually this can be done only by adopting time-saving procedures, reducing reoperation, or reducing process scrap. When scrap is viewed not from the standpoint of what the scrap material cost, but as a certain number of units not produced, the inspector making the decision to reoperate or to scrap parts gains added importance.

Quality of finish (and product) can be maintained and cost of product controlled only by alert inspectors who can and will make an intelligent interpretation and application of inspection standards and policies. Usually such men cannot be hired; they must be trained. For some inspection jobs, only the more experienced production workers are selected, and these men are then paid more than the production workers to emphasize the importance of their work. Some inspectors are hired for that specific job, and are paid less than production men in their unit. This policy produces inspectors who cannot be expected to take a responsible view of their work, or to feel proud of their positions in the organization. Further, they cannot make decisions based on a thorough knowledge of the manufacturing process, because they have had no production background.

Too often inspection and scrap reports place the majority of the blame for excessive reoperation and process scrap upon one particular operating unit, whether that unit be guilty or not. Such reports are of value only when prepared by intelligent, trained inspectors. Then, and only then, do they identify the real source of loss and focus attention on the operation responsible for the defective work.

E. A. Blount

Finishing Operations

In the Parts Division, Reynolds Metals Company, aluminum parts are fabricated and finished by anodizing, phosphatizing, and by spray painting in versatile, well engineered finishing setups.

By EZRA A. BLOUNT

PF FEATURE

The Parts Division, located in Plants 12 and 14 of the Reynolds Metals Company, Louisville, Ky., is concerned with the fabrication and finishing of all manner of aluminum products, varying from coffee pots to window frames, from small refrigerator trays to 12-foot, 1-piece boats, and from domestic washing machine tubs to sections of aluminum siding. The products are fabricated by stamping, forming, resistance or torch welding, and then finished by anodizing, anodizing and painting, or lacquering, or by phosphating and painting.

Plant 12 Operations

In Plant 12 washer tubs and miscellaneous parts are finished by anodizing; boats are finished by a combination of etching and spray painting, and aluminum siding is finished by Alodizing and spray painting.

The various parts are formed from aluminum sheet by the usual press and assembly welding operations. Drawing the entire hull for the boat, which has an overall length of 12 ft., a depth of 22 inches, and a width at the beam of 54 inches, is the most spectacular of these operations. This is accomplished, using Reynolds R 361 alloy sheet, on a Clearing 1700-ton double-acting mechanical press, using special dies weighing approximately 30 tons. Figure 1 shows

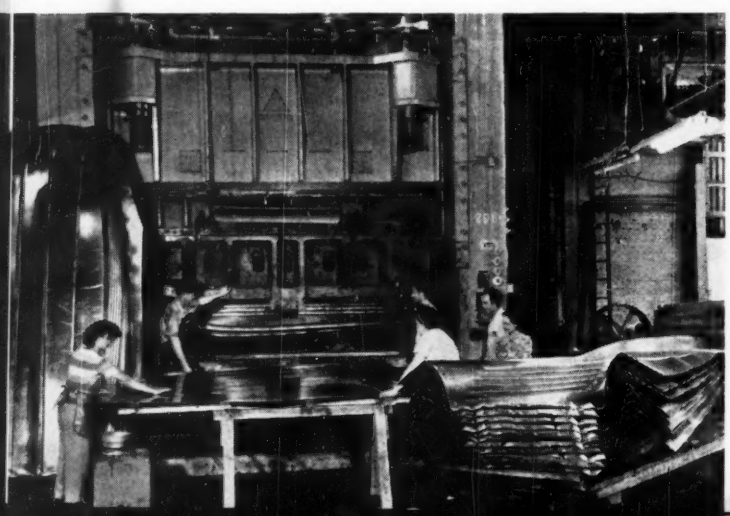

Fig. 1—Boat hulls are drawn in one operation in this 1700-ton Clearing press. Operators load blanks from the table in the foreground, and stack the formed hulls on the truck at the right.

the press used for drawing the boat hulls.

Prior to torch, resistance, or arc welding assembly operations, drawing compound, dirt, and grease must be removed from the formed parts. This is accomplished in a series of 1200 gallon tanks with process sequence as follows: dip in Diversey No. 36, operated at 160 deg. F.; rinse in cold water; dip in Diversey No. 514 deoxidizer; rinse in cold water; rinse in hot water. Various cleaned parts are next assembled by one of the welding techniques mentioned. In the case of the aluminum boat, the transom and the hull are jigged to ensure correct positioning, and Heliarc welded.

The Anodizing Process

Aluminum products, such as refrigerator trays and household wash machine tubs, are anodized after welding to form a corrosion - resistant surface coating on the part in question. Transported to the anodizing department the parts are processed in a series of tanks, each 5 ft. wide by 20 ft. long by 7 ft. deep, and having a capacity of 4200 gallons of solution.

Specially designed aluminum racks are used to hold the parts securely in the proper position for most efficient anodizing, and the racks are transferred from tank to tank by an overhead tramrail conveyor. The racks of simpler design are not insulated, but the more complicated racks are coated with a rack insulation material. Cost of the rack and its time cycle in the etching solution determines whether it is more economical to protect the rack, or to replace it more frequently.

Racked parts are anodized according to the following process cycle:

1. Alkali clean for 5-10 min. in a solution of 6 oz./gal. Diversey No.

Fig. 2 — A load of washer tubs being lowered into one of the etching solution tanks. Note spring contact rods to hold tubs securely. Tank overflow drains and automatic temperature control valves may be seen in foreground.

36, air agitated, and operated at 160 deg. F.

2. Rinse in cold water spray rinse tank.
3. Dip in a deoxidizing solution at room temperature, air agitated (Fred Gumm Chemical Co. 180 K)
4. Rinse in cold water.
5. Etch in a caustic solution, operated at 120 deg. F., containing 4 to 6 oz./gal. of either Turco ABC or Pennsalt A-15 metal etching compound. Refrigerator parts are etched for 5 min. and washer tubs for 10 minutes. Fig. 2 shows an operator lowering a rack of washer tubs into one of the etching tanks.
6. Rinse in cold running water, air agitated.
7. Anodize for 18 min. in a solution of 15 to 18 per cent sulfuric acid, maintained at 68 deg. F. A direct current of 10 to 12 amps./sq. ft. at 18 volts is employed; a total current of 14,000 amperes is available for the 3 anodizing tanks. This treatment produces on the parts a coating of aluminum oxide approximately 0.00015 in. thick.

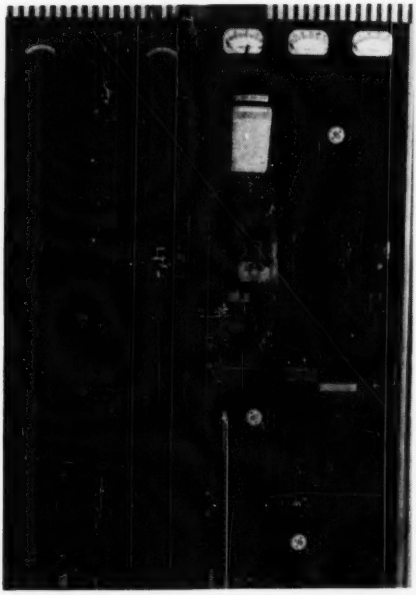

Fig. 4 — A view of the panel on which are mounted the electrical controls for the anodizing process

8. Rinse in cold water spray rinse tank.
9. Seal for 18 min. in hot water (200 deg. F.). This treatment, carried out for the same length of time as the anodizing process, trans-

Fig. 3 — After refrigerator trays are sealed, they dry quickly and are unracked. This rack, unlike the one shown in Fig. 2, is not insulated.

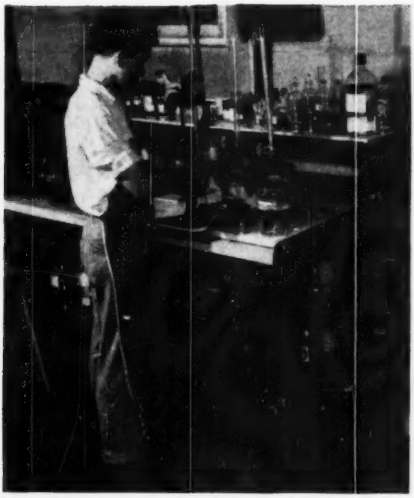

Fig. 5—In this laboratory, finishing processes are controlled, and checks made on the quality of the finished product.

forms the anodic coating to a hard, corrosion-resistant surface film.

Parts removed from the sealing tanks air dry quickly and are unracked as shown in Fig. 3.

Before racks are used again, they are stripped for 3 min. in a solution of 12 to 16 oz./gal. Diversey No. 511 to remove the anodic coating from the racks. Otherwise the racks would not make good electrical contact with the next load of parts.

Most efficient utilization of equipment is made possible by using duplicate tanks for some processes, as required by the time cycle. There are two plain steel cleaner tanks, one cold water spray rinse, one lead-lined chromic-phosphoric solution tank, one stainless steel water rinse tank, two steel metal etching tanks, one water rinse tank, three lead-lined anodizing

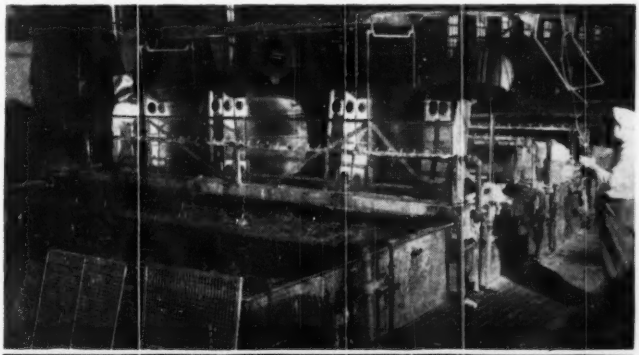

Fig. 6 — A rack of welded boat hulls is lowered into one of the alkaline cleaner tanks in the anodizing line. As can be noted in the photograph, a number of tanks are equipped with a row of nozzles on each side so that parts may be rinsed as they are removed from the tank. This innovation cuts down dragout loss and keeps the water in the rinse tank clean, so that a more thorough rinse is obtained.

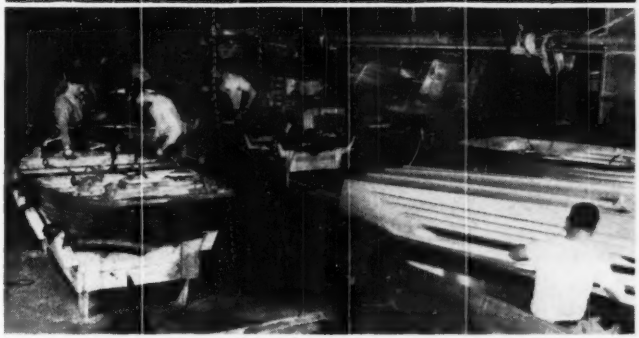

Fig. 7—A view of the boat assembly and painting department. Operator in right foreground is masking a boat hull for striping. Boat on tramrail in background is enroute to spray booth for painting.

tanks equipped with lead cooling coils, one lead-lined spray rinse tank, three aluminum tanks for hot water sealing, and one anodic strip tank.

Tank temperatures are controlled by Brown Recording-Controlling Instruments. The usual electrical control equipment is employed, as can be seen in Fig. 4, and in addition, a recording ammeter is employed to maintain a record of anodizing operations.

Power is supplied to the anodizing tanks by two Columbia 5,000-ampere and one Chandeysson 4,000-ampere generators. An interesting and unusual feature of the power installation is that aluminum bus bars are employed (instead of the conventional copper) to conduct the current from the generator room to the treatment tanks.

Curtis refrigerating units, installed in duplicate, cool the recirculated water used to control the anodizing solution temperature. Fumes from processing tanks are exhausted by three Ilg B-90 exhaust fans. A downdraft system is used, with provisions to remove any sulfuric acid droplets before the fumes reach the outside air.

Processing solutions are controlled and maintained with the aid of chemical analysis performed in the control laboratory under the direction of R. J. Liepertz, metallurgist. Figure 5 shows a chemist at work in the laboratory. Alkali cleaning solutions and metal etching solutions are analyzed daily and maintained at constant alkalinity. Cleaners are changed every two months, and etching solutions approximately once per month. Standard solutions of these materials are maintained in the laboratory to aid in the control work. The anodizing solutions are analyzed daily for the sulfuric acid and aluminum contents. When the concentration of aluminum reaches 20 gm./l., the solutions are discarded.

Daily checks of aluminum oxide coating thickness are also made in the laboratory, using the standard A.S.T.M. anodic strip test (a solution of 20 gm./l. chromic acid and 35 cc./l. phosphoric acid). A sample is stripped to constant weight, and the weight and thickness of the coating calculated.

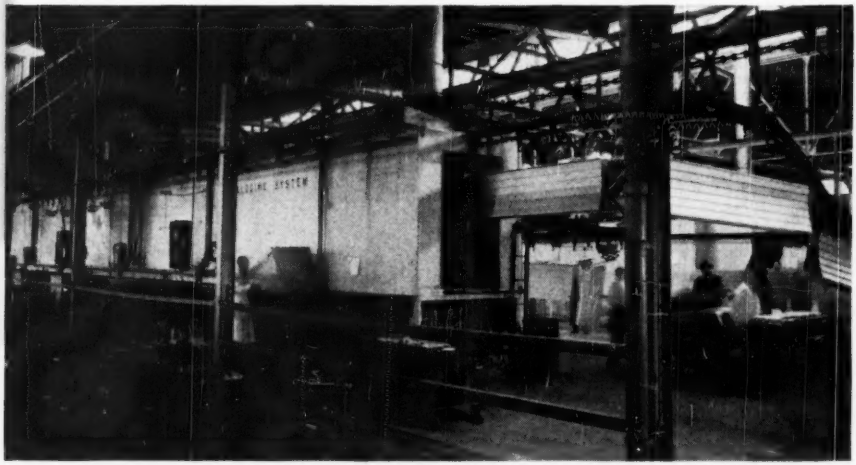

Fig. 8—Overall view of the Koch-engineered Alodizing, painting, and baking installation, showing, in the foreground, siding entering the Alodizing tunnel, and, in the background, painted and baked siding being unloaded from the paint conveyor.

Boat Finishing

The Reynolds 12-foot boat, after assembly welding, is processed through cleaning and etching solutions, as shown in Fig. 6, to remove handling dirt and grease and prepare the surface for painting. Suspended from an overhead chain conveyor, the boat is painted in the spray booth shown in the background of Fig. 7. A vinyl type wash coat primer, and a vinyl anticorrosive finish, followed by an aluminum pigmented vinyl coating, are sprayed on the boat. All three are C. A. Woolsey air dry materials. After the many components and attractive accessories are assembled to the boat hull, stripes to accentuate the streamlined appearance of the boat are sprayed on, masking tape being used to control the sprayed area.

The completed craft has a very impressive appearance. Light (approximately 150 lb.) yet strong, it can be handled with ease, and transported from place to place with a minimum of effort.

Alodizing and Finishing Siding

In designing aluminum products for use in every conceivable field, Reynolds has not neglected the architectural. Twelve-foot sections of weatherboard siding, equivalent to six siding boards, embossed in a patented non-glare pattern, are major production items at Plant 12 in Louisville.

The siding is cleaned, given an amorphous phosphate-chromate type corrosion resistant coating, and finished with white baking enamel in a completely conveyorized finishing installation built by George Koch Sons, Inc., Evansville, Indiana.

Siding sections are loaded, back to back on an overhead monorail conveyor, which travels at a speed of 32 ft./min., and phosphatized (Alodized) in a spray cleaning and treating machine, a view of which is shown in Fig. 8.

In the first 12 ft. section of the machine siding panels are sprayed clean with a solution containing 1.5 oz./gal. *Ridoline cleaner maintained at 160 deg. F. A 750 gal./min. pump circulates the cleaning solution from a 2400 gal. storage tank through the spray nozzles so as to maintain a pressure of

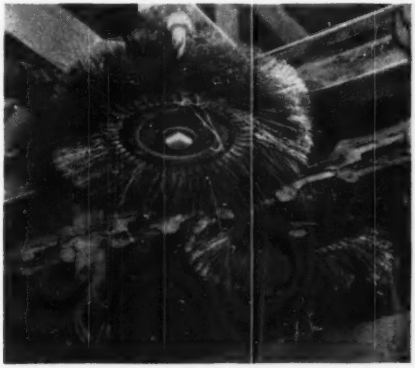

Fig. 9—A close-up view of paint conveyor chain showing wire brushes mounted to remove paint particles from chain

20 p.s.i. The solution returns by gravity to the storage tank.

Following the cleaning operation, the panels are cold water rinsed in a 6 ft. section of the processing machine. The rinse water sprayed on the siding at 20 p.s.i. is recirculated by a 450 g.p.m. pump in series with a 1200 gal. storage tank, to which fresh water is constantly added.

The next 8 ft. section of the treating machine is devoted to the *Alodine process. A solution of Alodine, held at 120 deg. F., is recirculated through the system from an 850 gal. storage tank at the rate of 150 g.p.m. and at a pressure of 10 p.s.i. The phosphoric acid-containing solution is controlled by chemical analysis so that a 5.0 cc. sample will neutralize 4.5 cc. of N sodium hydroxide. Due to the acidic nature of the solution, the storage tank

* Reg. Trade Marks — American Chemical Paint Co.

Fig. 10 — Parts are fed into the pressure spray washer to be cleaned and rinsed automatically.

and machine section are stainless steel. A cold water spray rinse follows the Alodine treatment.

In the 6 ft. section of the processing tunnel immediately following, siding is sprayed with a *Deoxylyte rinse under 15 p.s.i. pressure. The Deoxylyte solution is controlled at a pH of 4.5 to 5.5 colorimetric and maintained at a temperature of 130 deg. F. A 150 g.p.m. pump circulates the solution from the 780 gal. storage tank through the spray nozzles. The several chemical solution tanks mentioned are equipped with proportioning pumps to assist in adding chemicals and maintaining correct solution strengths.

Siding panels now pass through a 50 ft. drying section of the processing tunnel in which electrically-heated, recirculated air at a temperature of 400 deg. F. evaporates all moisture from the treated parts. The aluminum siding sections, now covered with an inert chromate film, are transferred by hand to another overhead chain conveyor which transports them through the paint system.

Before the treated panels are sprayed, operators with tack rags remove any surface dust or loose particles which would have prevented a satisfactory paint job. Traveling at a speed of 24 ft./min., the siding sections pass through a Ransburg electrostatic spray system, equipped with reciprocating gun mounts controlled by an electric eye. Immediately following the electrostatic spray installation is a 20 ft. long down-draft water-wash spray booth which can be utilized for manual spraying when production conditions do not warrant employing the Ransburg unit. In the water-wash booth, a deflocculating material is used to condition the water, collect paint overspray, and control foaming.

Leaving the spray booth, panels pass into an electrically heated oven for a 15 to 30-minute bake at 280 to 400 deg. F. The temperature is controlled automatically by a Micromax recorder-controller installation.

To solve the problem of overspray paint accumulating on the chain conveyor and contaminating parts in process, wire brushes have been mounted on either side of the conveyor, as shown in Fig. 9, so located that the chain passes between the brushes after the painted and baked panels have been removed and before unpainted panels are on the conveyor.

Good plant layout and equipment design is illustrated in this installation, in that painted, baked siding sections emerge from the oven at a location not far from the entrance to the Alodine tunnel, so that movement of raw stock

and finished sections can be accomplished most efficiently.

Plant 14 Operations

Two parts, produced in Plant 14 in large quantities, are refrigerator hydrator pans and casement window frames. The hydrator pans, coated with a special plastic drawing compound are press-formed and then proceed to the finishing section of the plant for processing through anodizing and spray painting operations.

Drawing compound and other surface contaminants are removed in a Detrex pressure spray washer, a view of which is shown in Fig. 10, after which the parts are transferred to the anodizing department, pictured in Fig. 11. The anodizing cycle, while generally the same as that in Plant 12, differs in some equipment and process details. Although an alkaline cleaning solution (Diversey No. 36) is maintained for use in an emergency, since the parts have been cleaned in the spray washer, they can begin the anodizing cycle with a 2-minute dip in the deoxidizing solution (Fred Gumm Chemical Co. 180 K, 9 oz./gal.) which is used cold in a 1600 gal. stainless steel tank, and air agitated.

A cold water rinse follows, after which the parts are etched for 2 minutes in Turco ABC (7.5 oz./gal.), air agitated and held at 140 deg. F. by a Brown temperature controller-recorder. The rest of the anodizing cycle is similar to that previously described. The equipment used is also similar, with the exceptions of a lead-lined spray rinse tank used after the anodizing operation and a second rinse tank made of aluminum. In addition the sealer tanks in this setup are all made of aluminum liners set in steel jackets in which hot water circulates. The sealing tanks employ only deionized

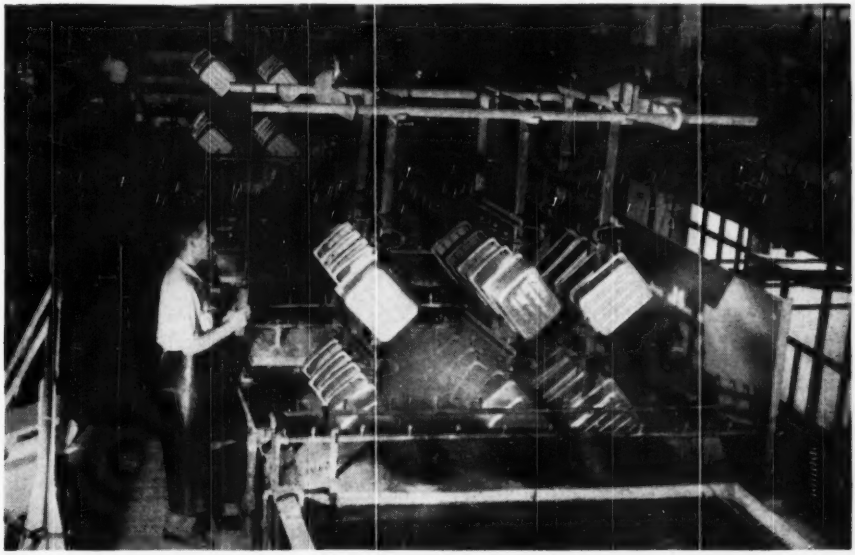

Fig. 11—A view of the anodizing installation in Plant 14. As the refrigerator hydrators are removed from the processing tank, water sprays from the spray nozzles mounted on each side of the tank, and rinses back into the tank most of the solution which would otherwise be lost as dragout.

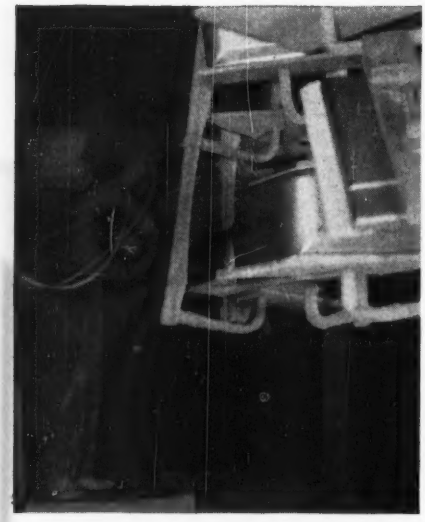

Fig. 12—Hydrator pans are sprayed in a three-booth pressurized spray system, in which make-up air is filtered before it is added to the system. In addition, operators wear spray hoods, individually supplied with fresh, clean air.

water, which is added to the tanks constantly (1 gal./min.); the solutions are changed weekly.

Three generators, a Columbia, an Electric Products, and a Chandeysson provide a total of 8500 amperes at 15 volts. As in Plant 12, aluminum bus bars carry the current from the generator room to the anodizing tanks.

After anodizing and sealing, hydrator pans are unracked, inspected for thickness of anodic coating with a voltage breakdown gage, and loaded, two per rack, on specially designed carriers attached to an overhead chain conveyor. The conveyor transports the pans, which are "tacked off" with Harding tack rags, through three 10-foot water-wash spray booths, to which make-up air, filtered through AAF air filters, is supplied under a slight pressure. In the booths spray finishers apply a preliminary mist coat and two finish coats of Du Pont Dulux 700 white baking enamel. Figure 12 illustrates this operation. The pans pass directly from the final spray booth into a 60 ft. infra-red baking oven for an 8 min. bake at 340 deg. F. While in the oven, the racks rotate constantly to ensure an evenly baked finish. Leaving the infra-red oven (see Fig. 13) the hydrators are unracked, inspected, assembled and packed for shipment.

Window Frame Finishing

Aluminum casement window frames, fabricated in Plant 14, are processed through a cleaning and etching setup, which, for the sake of efficiency, is incorporated into the anodizing line, and then finished in clear lacquer. The cleaning process is as follows:

1. Clean in hot alkaline cleaner.
2. Rinse in cold running water.
3. Etch in a mixture of nitric and

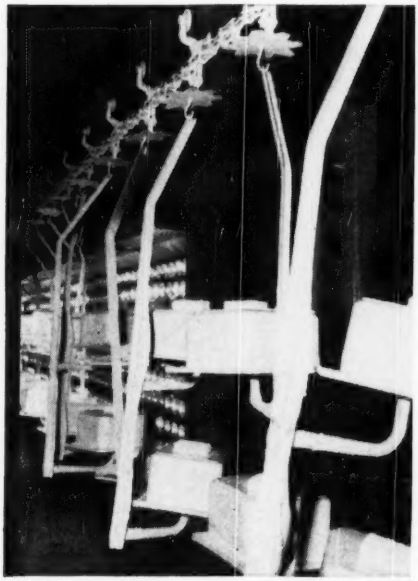

Fig. 13 — Painted hydrators emerge from the infra-red baking oven. The notched blank at the top of each carrier meshes with a rack in the oven to rotate the carriers during the baking process.

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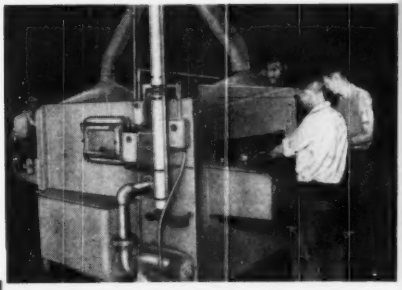

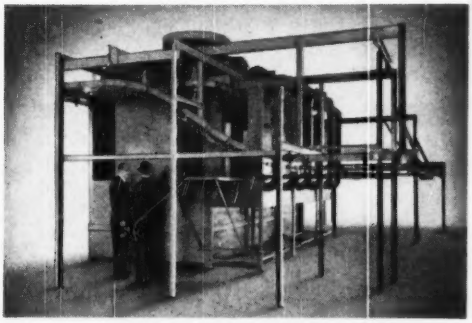

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hydrofluoric acids. This solution, employed in a stainless steel tank, is used instead of a caustic etch because it forms a "softer" surface on the window frames.

4. Rinse in cold running water.
5. Rinse in hot water.
6. Air dry.

The window frames are then hung on carriers attached to a monorail chain conveyor, and transported through a painting and drying setup at the rate of 16.5 ft./min. The frames are dip coated in a tank containing the lacquer which air dries along a 100 ft. distance prior to the inspection station. If necessary to force dry, a 50 ft. infrared oven is available.

Reynolds Plants 12 and 14 are equipped to manufacture almost any aluminum product made from sheet or bar stock. Both the size and scope of equipment available, and particularly the versatility of the finishing installations, make it possible for process engineers to schedule production of articles to conform with almost any specification requirement.

Recent developments in the manufacture of porcelain enamel make possible the production of intricately-shaped parts coated with this material.

In U. S. Patent 2,456,650, A. O. Ryan describes the equipment and method used to form a latex coating on single or stranded wire. The wire is introduced into the center of a viscosity flowing stream of latex in glycerine. Thus the flow consists of a core of wire surrounded by a coating of latex in a viscous stream of glycerine, which serves both as the vehicle and coagulating agent. Under these conditions the glycerine will support and confine the latex to a definite size and shape by acting as a lubricating, mobile and confining wall. When the latex coating solidifies, the filament is withdrawn from the confining liquid as a coated wire.

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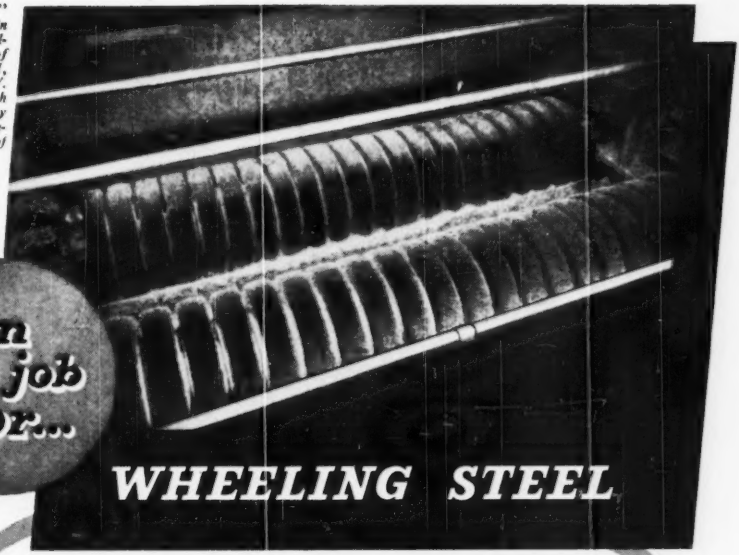

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Soap In Metal Treatments

By DR. GEORGIA LEFFINGWELL

THE action of soap in industrial processes is due to a variety of mechanisms, each one of which can be called upon, if desired, to perform specific functions[1]. Its status as an effective detergent and outstanding cleansing agent rests, in large measure, on its ability to emulsify greasy dirt. The same mechanism helps to explain its use for stabilizing ordinarily immiscible liquids to produce emulsions of great importance to industry. Soap was the first practically useful surface active agent and still remains one of the most valuable materials for obtaining good wetting action and penetration[2]. It is also a good lubricant, and is used in the manufacture of greases and in metal stamping and drawing compounds.

Standard commercial soaps often serve adequately for the purpose for which they are used, but sometimes more specialized products may be formulated to meet certain requisites. By combining the bases of potassium, sodium, or ammonium with appropriate oils (glycerides) or fatty acids, the technologists can prepare newer, faster soaps with high emulsifying properties, good rinsability, or other desirable characteristics.

Soap is an important material in several standard metal cleaning methods. Absolute cleanliness of the metal surface is, of course, a prime requisite for successful electroplating, anodizing, painting, enameling, or other types of coating treatments. Porosity, blistering, poor adhesion, and other faults in metal finishing are frequently attributable to inadequate cleaning. In the plating industry, according to Young[3], about 35 per cent of all finishing troubles are traceable to surface dirt.

Aqueous solutions of soap or soap-alkali mixtures remove oils, greases, and waxes and the inert materials associated with them from metal surfaces. These inert materials may include metallic chips from boring and machining, polishing and buffing residues, or various other kinds of dirt incident to the production or fabrication of the parts. Solutions of this kind usually are designed to release dirt and soil under conditions which permit simple rinsing with water to leave a clean surface.

A soap may be the sole active ingredient of a metal cleaning solution, and studies have been made of the nature of such solutions and the mechanism by which they remove dirt[4]. Soaps, formulated to provide high emulsification, are efficient as soaking type cleaners for removing heavier accumulations of greases, oils, and solid dirt. Soaps with good pentrating properties are used with marked success to clean buffing dirt out of the backgrounds and deep depressions of various metals. The soap is dissolved in suitable proportions in hot water, and the work is

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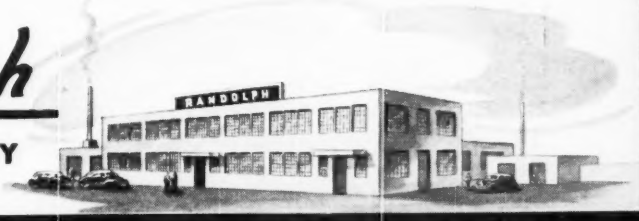

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soaked in the solution until the grease and dirt are loosened. This is followed by rinsing in clear water to remove both the dirt and soapy solution.

Since ordinary soap solutions have a pH of 9.5 to 10, they can be used to clean zinc and aluminum without causing etching. The soaps used are of the soluble, free-rinsing types, made from low titre stock[4].

Soap solutions are used as adjuncts to other types of cleaners. In one process of cleaning metals for electroplating, for example, the work is washed in a solvent or mixture of solvents to remove heavier oil and grease deposits. This is followed by a scrubbing with hot, soapy water, to which a small amount of soda may be added, to remove the last traces of grease, oil, and foreign matter. The cleaned articles are finally rinsed in hot and then in cold water to remove soap and alkali[5].

During the first World War, alkaline cleaning was adopted as a means of cleaning metals, strong caustic solutions serving to saponify the oils and greases. Such cleaners, however, were not particularly successful, since they did not wet the surface sufficiently and were difficult to rinse off. As pointed out by Townsend[6], the addition of soap and the use of alkaline salts instead of caustics have improved the conditions of the cleaner and reduced the hazard of flesh burns. The soap is used to improve emulsification and obtain better wetting action and thus increase cleaning speed. A number of soap-alkali combinations in which the work may be immersed for cleaning are described in the technical literature[7,8] and patent specifications[9,10].

In his discussion of metal cleaners, Young[8] notes that saponifiable cleaners generally contain free alkali (sodium hydroxide), salts of weak acids (sodium carbonate), soaps (sodium stearate), and suspended matter (ortho and metasilicates). In such preparations, the free alkali furnishes the base which unites with the saponifiable material. The weak acid salts act as buffers to maintain the correct pH. Soaps help to dissolve some of the organic materials as colloidal particles, thereby aiding the removal of dirt. Suspended matter gives rise to a scrubbing action which scours off the dirt from the surface.

Of interest in connection with soap-alkali cleaners is Seabright's[11] observation that soap can rejuvenate a cleaner if enough free alkali is still present to promote chemical action.

Some soap-alkali cleaners are better suited for use in soaking baths; others, for use in electrolytic methods; while certain others are adaptable to both systems. Hereford[12] notes that both saponification and emulsification can be accelerated by electrolysis. The composition of the solution used in electrocleaning will vary, of course, with the kind of metal being cleaned. Thus, for iron or steel, Crowley[5] sug-

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gests the use of a solution consisting of 8 ounces of sodium hydroxide and 4 ounces of laundry soap per gallon of water. For brass and other alloys of copper, 4 ounces of soda ash, 2 ounces of trisodium phosphate, 2 ounces of soap, and ½ ounce of sodium hydroxide are dissolved in each gallon of water.

According to Schmidt[13], strong alkaline solutions are the most satisfactory for cleaning magnesium die castings, and the procedure may be carried out by boiling or by cathodic electrolytic methods. A satisfactory cleaning solution for use in either of these methods, as given by this authority, consists of:

Trisodium phosphate	4 oz./gal.
Sodium carbonate	4 oz./gal.
Soap	0.1 oz./gal.

This solution is operated at 180 to 212 deg. F., and the time required is 5 to 15 minutes. As an electrolytic cleaner the solution may be operated below the boiling point without the necessity of agitation. The magnesium is made the cathode in the solution and a direct current of 10 to 28 amp./sq. ft. of surface is applied. Usually one to three minutes are required for complete removal of oil or grease.

In considering the removal of non-saponifiable compounds, like mineral oil, Young[3] remarks that such materials will not react with sodium hydroxide. However, alkali cleaners will remove them to a certain extent by suspending the foreign materials in the solution as an emulsion. This is especially true if soap is present. The soap provides a wetting action and augments the emulsification.

Recently, emulsifiable or emulsion type cleaners have been developed in which soap is often a major active ingredient. The emulsifiable cleaning method is generally recommended for cleaning parts after buffing or polishing, since the surface often contains oil, lime, metal particles, and abrasives such as rouge, emery, and tripoli. According to Townsend[6], emulsifiable cleaners must often be used to remove compounds containing tallow and emery. Being non-corrosive, emulsifiable cleaners do not attack metal surfaces and are suitable for cleaning any metal. Since they are only slightly alkaline, they may be used to clean chemically active metals like lead, aluminum, and zinc. These solutions are efficient and comparatively inexpensive; they are non-explosive and present a minimum fire hazard.

Emulsifiable cleaners are of two types. One type is produced by blending potassium oleate (soap) with kerosene and a blending agent such as butyl alcohol or cresylic acid. Up to 10 per cent of water may be added to increase the emulsifying action[6]. A somewhat more complex emulsion cleaner, containing 10 per cent of a vegetable oil soap as the detergent, has been described in detail in a recent patent[14].

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cleaning and finishing metals often utilize soap as an adjunct. In tumbling and burnishing methods soap is employed primarily as a lubricant, but it also provides a detergent action. The parts to be cleaned are loaded into barrels or drums containing steel balls or shot or similar material. A soap solution is then added and the combination is rotated at an appropriate speed. Such treatment removes sharp edges, burrs, fins, scale, and the like, and provides a bright, fairly smooth surface. Recommended for barrel burnishing aluminum parts[15], soap solutions are also used in cleaning stainless steel and other metals by tumbling[6]. In treating gold jewelry ball burnishing is generally carried out in a tank containing a solution of 1 to 3 ounces of neutral soap per gallon[7].

Soap, usually employed as a lubricant, but serving other functions as well, is used with grinding and polishing materials for treating metals. An interesting example of such utility is given in a standard method for producing a satin finish on aluminum. According to the manual[15] of a leading producer of this metal and its alloys, steel wool lubricated with soapy water can be used to satin-finish aluminum very satisfactorily.

On occasion, soap finds uses in connection with other finishing processes. For example, several years ago, investigators[16] found that adding soap to a silver electroplating bath results in the deposition of silver in hard, bright films that require little or no polishing. According to their patent, such results are obtained by adding a soap, such as sodium oleate, to a cyanide bath.

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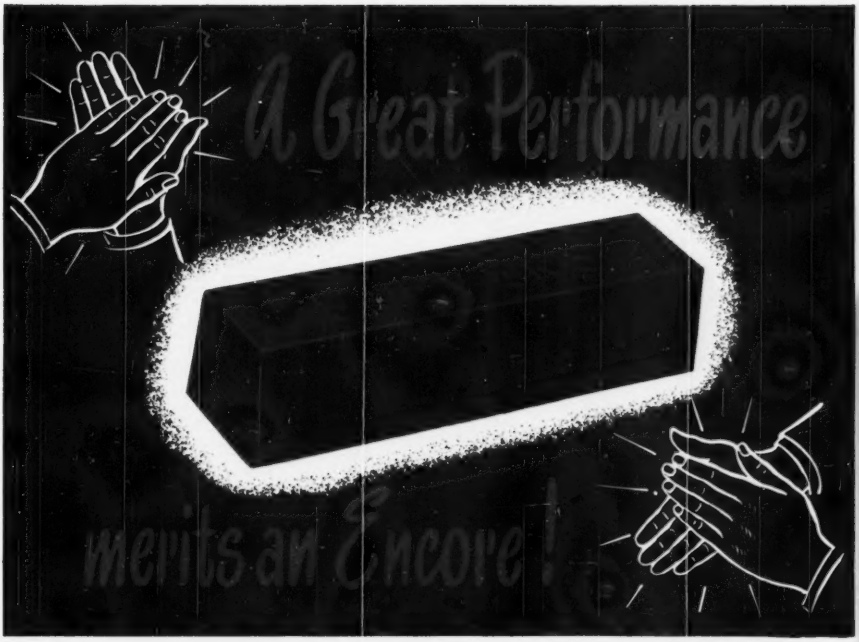
M. S. A. Bulletin No. CN-3. M. S. A. Faceshields for protection in handling acids and other chemicals, pouring hot metal, in gasoline refining, sanding, grinding, degreasing, and electroplating operations—wherever face and eyes are endangered by light, flying particles—are featured in a new 4-page bulletin published by Mine Safety Appliances Company, Pittsburgh 8, Pennsylvania.



—when Stevens Compositions play the leading role in Your Metal Finishing Operations

Just as "curtain calls" or encores measure the popularity of a performer in the theatre, so does continued usage signify product acceptance in the field of metal finishing.

Where economical, efficient production is called for, Stevens "job-qualified" compositions have long been known for their ability to "come through" with a dramatic performance. There's a reason. Absolute *quality-control* through all phases of formulation, plus over 45 years of specialized composition manufacturing experience, qualify Stevens finishing materials to do an exacting job, do it well and keep on doing it. Such performance merits an encore and gets it in the form of repeat business which keeps Stevens compositions on the job.

If your present or contemplated buffing or polishing operations involve the precision finishing of metals, plastics or new alloys—let Stevens make those operations profitable for you.

Should your requirements be such that they cannot be answered by a "job-qualified" composition in our Standard Line, Stevens' finishing specialists and laboratory staff will be glad to work with you and develop a "tailored-to-the-job" material that will exactly meet your particular finishing need.

Stevens men, methods and materials are dedicated to helping you solve your most vital finishing problems. *All we need is a "cue" from you. We'll follow through promptly.*

SINCE 1892

LEADING MANUFACTURERS OF POLISHING, BUFFING, PLATING EQUIPMENT AND SUPPLIES

FREDERIC B. Stevens INCORPORATED

DETROIT 16, MICHIGAN

METAL FINISHING EQUIPMENT AND SUPPLIES DIVISION

FREDERIC B. STEVENS OF CANADA, LTD. WINDSOR, TORONTO, ONTARIO

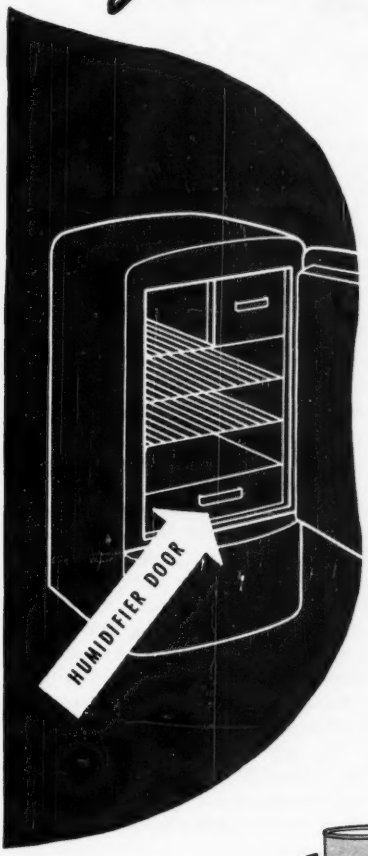
NEW LOWE BROTHERS

✻Lowe Brothers new *Styrene Finish* overcomes the many finishing problems that have long hindered plastic product manufacturers. It is the ideal finish for all kinds of plastic equipment, utensils and novelties where color and lasting attractiveness are desired. Remember—it matters not *what you* manufacture, Lowe Brothers may have the scientific answers to your finishing requirements or problems.

This advertisement is based on facts from the Lowe Brothers Case History Files.

STYRENE FINISH

solves Polystyrene finishing problems!



When a large refrigerator manufacturer was recently faced with the difficulties of finishing a polystyrene humidifier door, counsel with a Lowe Brothers "Finishing Specialist" led to the development of a new product—Lowe Brothers *Styrene Finish*—which solves *all* the old problems of finishing plastic products!

The humidifier door required a finish that would *adhere* to polystyrene, yet, would not etch the surface—one that would stand up under conditions of constant humidity, resist foods, greases, juices and soaps. *Styrene Finish* answers every requisite. Moreover, it can be made in *any* color; sprays on easily; dries in 10 minutes (quicker still if force dried) to a good, smooth gloss. From every standpoint, new *Styrene Finish* is both practical and economical in use!

Development of this new finish provides a perfect example of the way manufacturers *everywhere* are benefiting by the services and suggestions of Lowe Brothers "Finishing Specialists." Their thorough knowledge of finishing methods and materials may lead to better finishing *results* for *you*. Why not talk it over? No cost or obligation. Write today.

THE LOWE BROTHERS COMPANY • DAYTON 2, OHIO

LEADERSHIP THROUGH CONSISTENT SERVICE

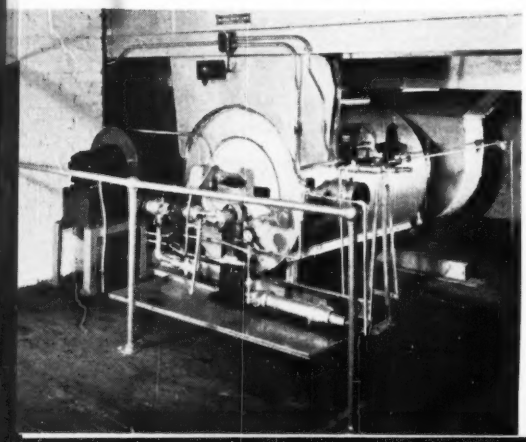
Lowe Brothers FINISHES FOR INDUSTRY

Fire Prevention in the Finishing Department

By ROLLIN H. WAMPLER

BECAUSE of the inflammable nature of some types of finishing materials, fire prevention is a topic worthy of considerable study wherever such materials are used. The problem would not be so serious were it not for the fact that the vapors of inflammable liquids can build up to such a concentration that they may be ignited by a spark. The ignited vapors can under the right conditions explode with terrific violence or cause serious damage by fire.

Fig. 1—Heating units for baking ovens should be remotely located from areas where solvent vapors may accumulate, as shown in this illustration.
(Photo courtesy George Koch Sons, Inc., Evansville, Ind.)



One way in which to eliminate fires in the finishing department is to prevent the accumulation of inflammable vapors in the air or to keep the vapor concentration below the danger point. Spray booths should be provided with fans which are adequate to remove overspray as fast as it is produced. Some of the older types of spray booths were designed for guns that consumed perhaps 6 or 8 cubic feet of air per minute. These guns were later replaced with high speed guns which utilize 12 or more cubic feet of air per minute. The result in many cases is that the paint overspray is not removed as fast as it is produced and some of the overspray drifts back into the room to create a vapor hazard.

Another condition contributing to the fire hazard in the finishing department is the lack of provision for replacing the air that is exhausted by the spray fans. In the summer time when the windows are open, sufficient fresh air is provided for air which has been exhausted by fans. However, in the winter time when all windows and doors in the department may be closed, it is difficult for fresh air to enter and replace the air which has been exhausted. Under such conditions the efficiency of the exhaust fans is greatly

Fig. 2—In the finishing room, a soda-acid type fire extinguisher, such as shown herewith, can be very effective in extinguishing a fire in the feathery accumulation on the sides of spray booths or in the ducts.
(Photo courtesy The General Detroit Corp., Detroit, Mich.)

reduced, with the result that spray fumes drift back into the finishing room. By simply leaving open a door or window or the installation of a system to bring in fresh, filtered, and warm air from the outside, the problem of efficiently removing spray fumes can be solved.

Dipping tanks should be provided with hoods and exhaust fans to remove vapors. Paint and varnish removers, as well as inflammable metal cleaners, should always be used where good air circulation is provided by open windows or exhaust fans. Areas where coated articles are dried should be provided with sufficient air circulation to remove vapors. All tanks and pails should be covered when not in use to prevent the building up of vapor concentration in the air, as well as to prevent skinning or other deterioration of the material.

A second way in which to prevent fires in the finishing department is to eliminate the possibility of ignition of vapors by open flames, glowing materials, or static sparks. Fire insurance rating bureaus require that "no smoking" signs be posted wherever finishing materials are used. The no smoking rule should be rigidly enforced by the finishing superintendent. Carelessness in smoking is one of the most common causes of fires, and the smoking habits of employees in finishing departments should be closely observed for their own protection as well as for the safety of the plant.

Defective and improper electrical equipment provides another possible source of fire in the finishing department. All electrical equipment in the department should preferably be that approved by the Underwriters' Laboratories as suitable for hazardous locations (Class 1, Group D). Electrical wiring should conform to Article 500 of the National Electric Code which states, among other things, that the wiring should be in conduit, with poured seals at the joints.

Exposed electric bulbs should be eliminated in the working area where finishing materials are used since a bulb that is broken might result in the ignition of vapors present in the area.

Fig. 3—A foam-type chemical fire engine, such as illustrated herewith, is said to be a valuable supplement to the smaller portable extinguishers.
(Photo courtesy The General Detroit Corp., Detroit, Mich.)

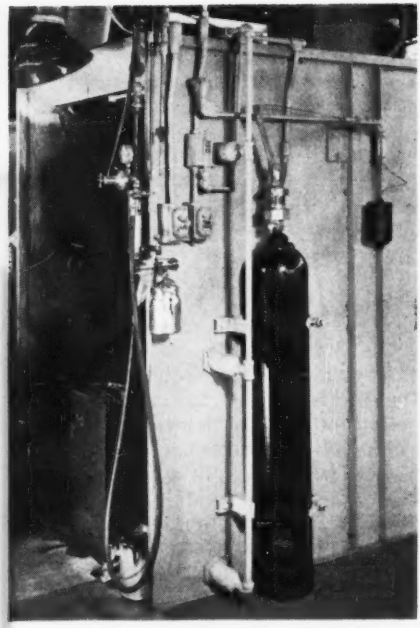


Fig. 4—This illustration shows an installation of a one-cylinder carbon dioxide type system which is operated automatically. The first flash of fire causes the weight, shown at the right, to drop, thereby pulling the operating lever on the head of the cylinder, which contains 50 lb. of carbon dioxide gas.
(Photo courtesy Pyrene Manufacturing Co., Newark, N. J.)

Moreover, all motors employed in the department should be explosion-proof. Such motors are designed to prevent a solvent flash from traveling out into the room should one occur within the motor itself. In addition, all moving machinery in the finishing department should be grounded as a precaution against formation of static electricity.

Drive shafts and belts should be avoided wherever possible since the static charges are likely to build up and arc. Gears or roller chains should be employed in driving mechanisms. To eliminate sparks made by metal tools, the covers for tanks in the finishing department should be made of non-sparkling metals or plywood.

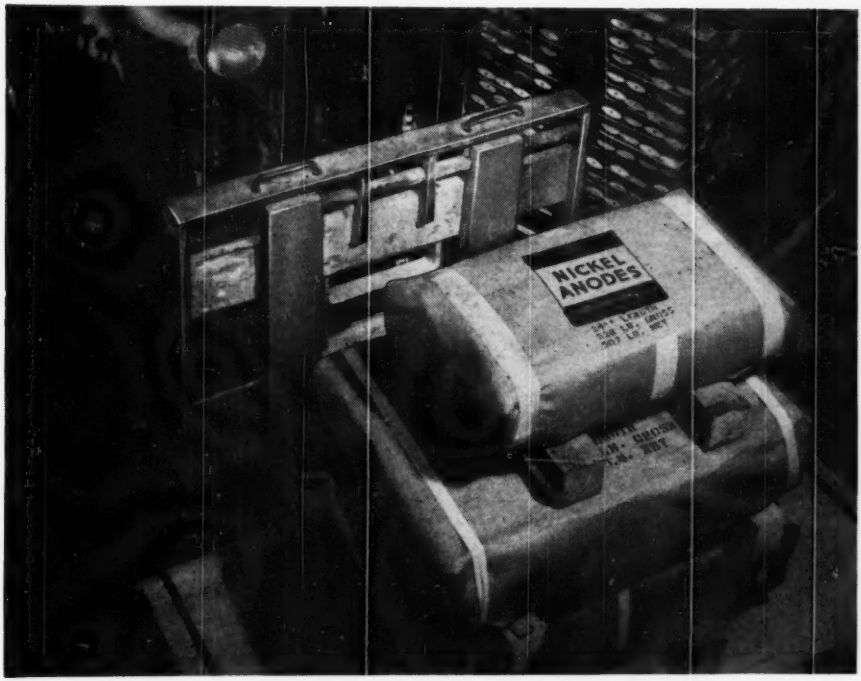
Where direct-fired ovens are used in the finishing department, adequate provision should be made for removing vapors that may accumulate during the baking process. It is especially important that so-called "dead spots" be eliminated within the oven.

In addition to vapors, there are other sources of fire hazards in the finishing department which should be eliminated. Oily rags left piled in a corner can ignite spontaneously. The heat of the oxidation process may build up to a point where the mass will ignite. Used rags should be disposed of in metal pails provided with suitable covers and collected every day. Slightly used rags should be hung on a line or spread out so that any heat generated will be dissipated.

Moreover, overspray should not be allowed to accumulate on the inside of spray booths and exhaust ducts. Such finely divided solids may ignite spontaneously, especially if an oxidizing agent should come in contact with them.

Means for fire fighting should, of course, be provided in the finishing department. Insurance rating bureaus provide penalties for lack of such equipment. The most critical period when a fire breaks out is the first 3 to 5 minutes before the public fire equipment can arrive on the scene. For this reason, local fire-fighting equipment should be provided. The small portable soda-acid, foam-type, vaporizing liquid-type, and carbon dioxide extinguishers are simple to use and effective. Several extinguishers should be available in every finishing room.

While the soda-acid extinguisher can be very effective in extinguishing a fire in the feathery accumulation on the sides of spray booths or in the ducts, it should not be used if the fire is in a container of flammable liquid. In using the other types of extinguishers mentioned above, the stream of foam, liquid vapor, or carbon dioxide should



Harshaw Packaged Anodes

- easy to handle
- keeps anodes clean
- no return
- easy to open
- no deposit
- no extra cost

Harshaw anodes are now delivered in compact packages at no extra cost to the customer. The new Harshaw anode packages, which feature built-in skids, facilitate quick handling by mechanical or hand trucks. These anode packages stack easily and quickly. No container deposits or returns are necessary. Order your anodes from Harshaw. You will get a dependable product wrapped in a compact, protective package.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

Fig. 5 — In this illustration, a girl operator is shown using a 15-lb. squeeze - grip extinguisher on an actual fire in a dip tank and drain board. *(Photo courtesy Pyrene Manufacturing Co., Newark, N. J.)*

be directed downward to the base of the flame if it is to be effective. However, where the fire is in a dip tank or in a container of flammable liquid, the stream of foam or vaporizing liquid should be aimed at the far side of the container just above the liquid level, in order that the extinguishing agent may not become submerged in the liquid. The discharge of carbon dioxide should not be directed so close to the burning liquid that there is a tendency to blow the flammable liquid up out of the container.

Workmen should be trained in the use of portable fire extinguishing equipment. Foam-type and soda-acid extinguishers should be inspected and recharged periodically. Vaporizing-liquid type extinguishers should also be inspected periodically but need not be recharged annually, since the liquid remains good indefinitely. Carbon dioxide extinguishers should be weighed periodically to determine whether they contain effective charges. Larger extinguishers mounted on hand trucks are also useful around the finishing department to supplement the smaller portable extinguishers.

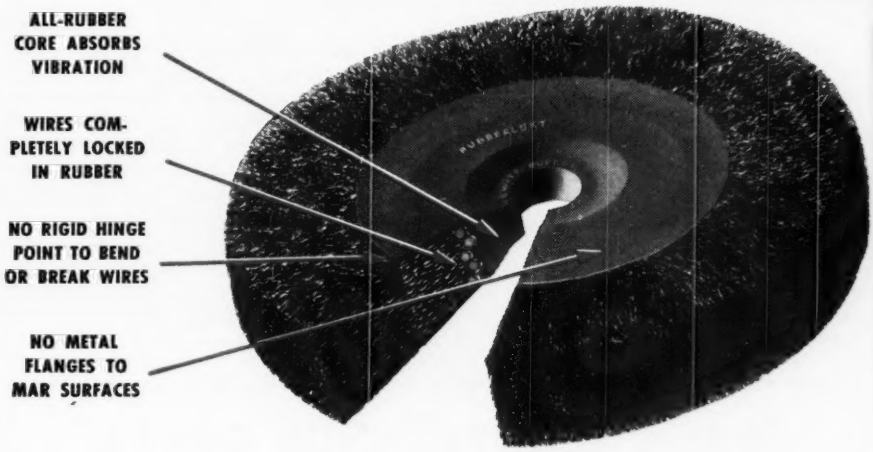
Although water is not as effective as other agents in oil and finishing material fires, the sheer weight and cooling effect of a large stream of water will often serve to advantage. For this reason, sprinkler protection and hose lines are often provided in finishing rooms. Pails of sand are useful for smothering small blazes.

In case of fire, it is important that the finishing superintendent and the sub-foremen maintain a calm and collected attitude. By providing proper leadership, they can prevent panic and direct the action of the workmen. When a fire breaks out, one man should be directed to turn in an alarm at once. The other workers should aid in fighting the blaze. In fire fighting as in any crisis, leadership is of the utmost importance.

New Color Computing Device

AN automatic color measuring machine has been developed which, in conjunction with a spectrophotometer, is able to distinguish more than 100,000,000 different colors. The new device, which is known as the General Aniline-Librascope Tristimulus Integrator, is used to find the answer to a series of computations involving integral calculus. The machine was in-

Now! A REALLY MODERN WIRE BRUSH ...WITH BRISTLES LOCKED IN RUBBER


ALL-RUBBER CORE ABSORBS VIBRATION
WIRES COMPLETELY LOCKED IN RUBBER
NO RIGID HINGE POINT TO BEND OR BREAK WIRES
NO METAL FLANGES TO MAR SURFACES

For many reasons, you'll say the HEWITT **RUBBERLOKT** ROTARY WIRE BRUSH is a better brush in every way!

More Brushing Points—Exclusive Hewitt rubber flange keeps bristles upright . . . provides more brushing points . . . gives you a smoother job.

Better Flare Control—Special rubber flange won't let wires bend or mat down. *Gives brush longer usable life!*

Faster, Better Work—Hewitt flexible rubber-locked mounting holds wires together compactly under pressure. Lets your workers do a faster, better job . . . even on irregular surfaces.

For more details about the new Hewitt **RUBBERLOKT** Rotary Wire Brush, write Hewitt Rubber Division, Dept. PF-10, 240 Kensington Avenue, Buffalo 5, N. Y.

DISTRIBUTORS: Your inquiries are invited. Some sales territories still available.

HEWITT
RUBBERLOKT
Rotary Wire Brush

Hewitt Rubber Division HEWITT-ROBINS INCORPORATED

vented by H. R. Davidson of General Anline & Film Corp., and engineered by L. W. Imm of Librascope, Inc.

The eye is able to tell whether or not two colors are the same; but, due to differences in word interpretation, color differences described by one person to another cannot be considered as accurate. Color scientists have developed an internationally accepted mathematical procedure for obtaining numbers which unambiguously specify colors.

Color, as we see it, is dependent upon three factors—first, the light, which is energy radiating from the sun or a lamp; second, the dyed, painted, or naturally colored material under observation which reflects or transmits varying percentages of light of different wave lengths; and third, the eyes which are viewing the color. Definite values on light and on the eye may be obtained from available, internationally accepted data, and a reflectance or transmittance value may be obtained by measuring with a spectrophotometer. Combined mathematically, these three values give a color equivalent.

The computations to be made are complicated, and, prior to the development of the Integrator, these computations were considered impractical due to the lengthy time and labor requirements. Now, however, the Integrator, which is connected directly to a spectrophotometer, gives the correct result the instant the spectrophotometer has "looked" at the color. The Integrator, which integrates continuously over all portions of the visible spectrum, will tell immediately whether a given color will match another color and, if not, will describe the difference between them. Together, the Integrator and the spectrophotometer not only measure and analyze color in 2½ minutes, but also give a numerical specification of what is seen with hitherto unobtainable accuracy.

SLASH MAINTENANCE COSTS!

by using

PLASCOTE NO. 1

The new peelable plastic boothcoating.

- Actual using reports prove Plascote No. 1 will cut booth cleaning time in half.
- It is applied quickly and easily by use of ordinary paint spray equipment, or by brushing.
- Shipped ready to apply, no pre-mixing necessary.
- Inflammable over-sprayed paints may be peeled from the spray booth walls in large sheets.
- Economical to use due to extensive coverage per gallon.

TEST SAMPLE OFFER:

Order 5 gallons, at the drum price of $1.95 gallon.

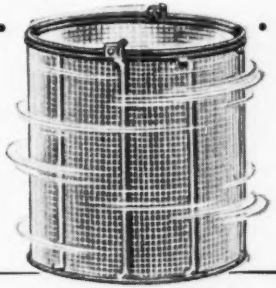
Chemco Products Company, Inc.

7740 WEST 47TH STREET LYONS, ILLINOIS

PAYS FOR ITSELF... *IN TIME SAVED*

Kreider Dryer with auxiliary steam heating unit (illustrated). Auxiliary natural gas heating unit available; also standard model without auxiliary heating.

Basket (below). Heavy gauge woven steel mesh over steel frame. Capacity, 1140 cu. ins.



Spin-Dries* up to 50 pounds in less than 2 minutes

Saves drying time. Kreider Dryer operates on ¾ h.p. at 625 r.p.m. . . . cuts drying time to as little as 35 secs.—no more than 2 mins.—for each 50 lbs.

Saves production time. Runs at top speed with maximum load, hour after hour, day after day. Ends drying "bottle necks". . . assures smooth, evenly dried surfaces, longer lasting lustre—fewer "rejects."

Saves maintenance time. Simple, sturdy construction reduces "time-outs" for repairs and servicing to a minimum. Assures long life.

See for yourself! Write Department PF-109 today for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.

***Only 2 simple steps required...**

(1) Operator places wire mesh basketful of small parts in Dryer . . . turns motor "ON."

(2) Operator turns motor "OFF" . . . presses foot brake . . . removes basket.

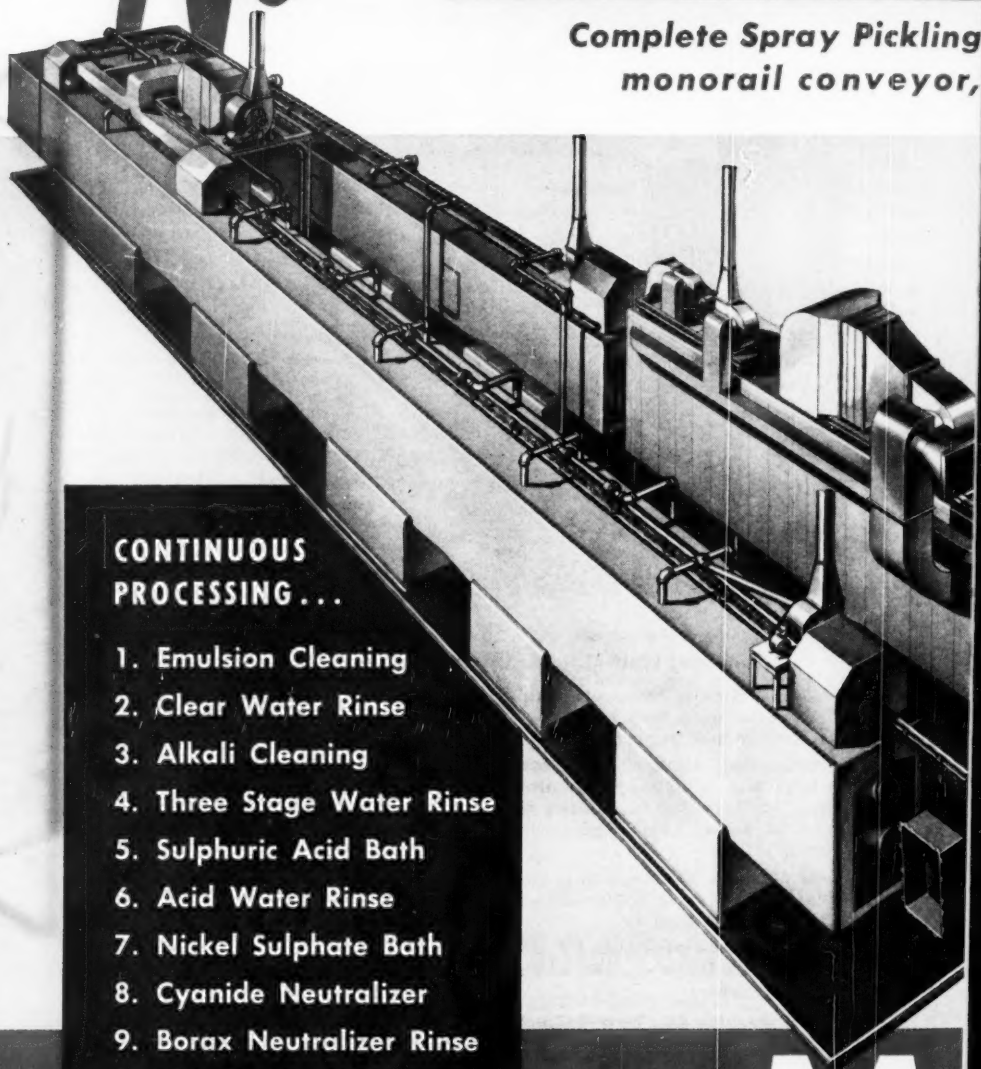
NEW HOLLAND *KREIDER* DRYER

New

Completely Enclosed Washing

Than One-Third . . . Permits

Complete Spray Pickling
monorail conveyor,



CONTINUOUS PROCESSING . . .

1. Emulsion Cleaning
2. Clear Water Rinse
3. Alkali Cleaning
4. Three Stage Water Rinse
5. Sulphuric Acid Bath
6. Acid Water Rinse
7. Nickel Sulphate Bath
8. Cyanide Neutralizer
9. Borax Neutralizer Rinse
10. Hot Air Dry-Off

M

ınd Pickling Machine Reduces Pickling Time to Less

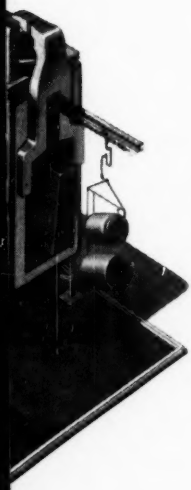
Vast Reduction in Volume of Processing Solutions!

quipment, with positive protection for continuous
s now available to porcelain enameling plants

The new Mahon Hydro-Hermetic Seal (Patents Applied For) makes possible this noteworthy advance in the development of practical and economical equipment for the preparation of metal surfaces to receive porcelain enamel.

The process is continuous through all operations: Emulsion Cleaning, Clear Water Rinse, Alkali Cleaning, Three Stage Water Rinse, Sulphuric Acid Bath, Acid Water Rinse, Nickel Sulphate Bath, Sodium Cyanide Neutralizer, Borax Neutralizer Rinse, and Hot Air Dry-Off.

Tanks and tunnel housing are of mild steel throughout except in areas where corrosive materials are in contact or fumes prevalent. In these areas, steel is lined with lead or rubber, or Monel Metal is employed. The manorail conveyor, which operates in the open above the machine, is fitted with Monel Metal adapters which are the load carrying medium that passes through the Hydro-Hermetic Seal—no spray or fumes can escape or work up the adapters to damage the conveyor.



The Hydro-Hermetic Seal, which seals the top of this machine throughout its entire length, greatly increases processing efficiency in each stage. It also prevents the loss of active chemical fumes, reduces ventilating requirements to a minimum, and eliminates both the necessity for a tremendous intake of air through an open conveyor slot—hitherto general practice, and the resulting necessity for replacement of air within the building.

These Mahon Pickling Machines can be designed to meet any requirement of product processing, production rate, or plant layout.

Whatever your finishing requirements may be, whether it be Pickling Equipment, Porcelain Enamel Spray Booths, Dryers, Cleaning and Rust Proofing Equipment, or a complete Finishing System, you can turn to Mahon with complete confidence for the right equipment to do your particular job with utmost efficiency and economy . . . remember that the Mahon organization has pioneered development in this highly specialized field for twenty-nine years. Broad experience in every industry where finishing constitutes a major production operation, backed by constant research and experimentation, has endowed Mahcn engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. A Mahon engineer will gladly explain the merits and the many advantages of this new type Pickling plant at your convenience.

THE R. C. MAHON COMPANY

Detroit 11, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems — including Pickling Equipment, Porcelain Enamel Spray Booths and Dryers, Metal Cleaning and Rust Proofing Equipment, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens. Also, Core Ovens, Shrink Ovens, Bend Ovens, Hydro-Foam Dust Collectors, and many other Units of Special Production Equipment.

AHON

27th ANNUAL MEETING

Federation of Paint and Varnish Production Clubs

CHALFONTE-HADDON HALL, ATLANTIC CITY, NEW JERSEY
NOVEMBER 3, 4 AND 5

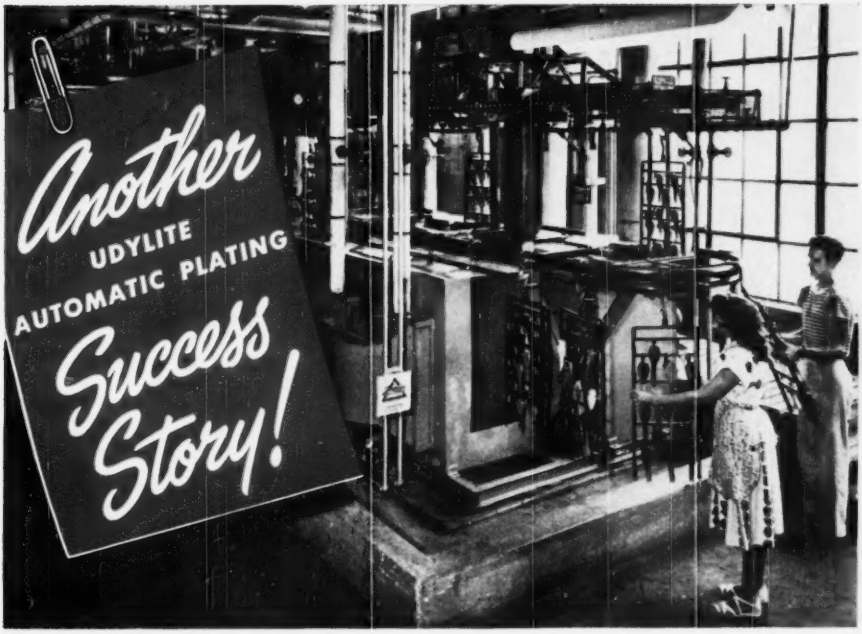
Plans are well advanced for the 1949 Convention of the Federation which will be held at the Chalfonte-Haddon Hall Hotels, Atlantic City, N. J., on November 3, 4 and 5, immediately following the annual convention of the National Paint, Varnish and Lacquer Association.

Arrangements have been made to open the Paint Industries' Show on Wednesday afternoon, November 2, so that the members of the Association can have an opportunity to see the exhibits. A cordial invitation has also been extended to the members to hear Wallace F. Bennett, President of the National Association of Manufacturers, who will be the principal speaker at the Wednesday morning session of the Association.

The business sessions for the three-day meeting of the Federation will include a varied program of technical papers by representatives of the Constituent Clubs and foreign countries as well as addresses on timely subjects by outstanding speakers.

Special entertainment will be provided for the ladies who attend the Convention with the annual Dance scheduled for Friday evening immediately following the Banquet. Excellent music and talented artists will supplement the usual good fellowship during this portion of the program.

Reservations for hotel accommodations should be sent directly to the Paint Industry Convention Bureau, 16 Central Pier, Atlantic City, N. J.



Production Stepped Up 25%—Now 1500 Parts Per Hour!

240 Man-Hours Saved Per Week!

Quality Improved—Rejects Reduced to ½ of 1%!

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Rollfast
ROLLER SKATES

● You can get results like these in YOUR plant, just as the Rollfast people did, by a simple and quick conversion to Udylite automatic machines.

You'll be miles ahead by choosing *Udylite*, because of important "hidden" values like these that don't show up in the initial estimate:

No long tie-ups in the plating room during installation — Udylite machines, shipped ready to run, can usually be installed over a week-end, and require but a few machinery movers. These compact machines require less working space, solving the load-and-unload space problem. Racks are within easy reach. And Udylite machines have astonished users with their low maintenance costs.

Write a "success story" like the one above in *your* plant — plan now to "go automatic" with Udylite equipment! We'll be glad to make recommendations, entirely without cost or obligation. Write *today*.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

Spotlighting FINISHING Progress

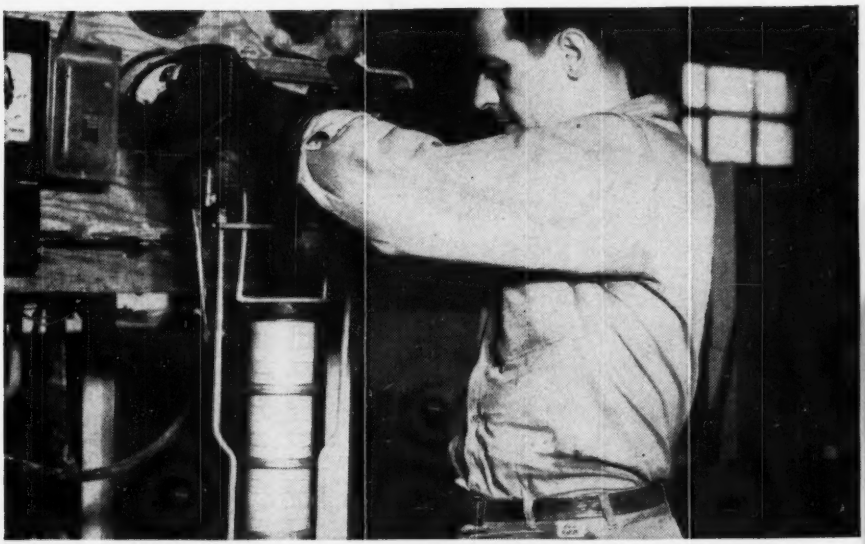
By DR. ALLEN G. GRAY

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

Specifications for Metal Protective Paints

THE Protective Coating Symposium at the 1949 N.A.C.E. meeting featured a discussion on the principles of writing specifications for metal protective paints presented in a paper by W. W. Cranmer, Industrial Test Laboratory, Philadelphia. It was emphasized by Cranmer that although the quality of the paint is determined by the specifications, the quality of the paint job is controlled by the care in cleaning and pretreating the metal and in the application of the paint. These latter factors in many cases may be considerably more important to the ultimate durability than is the paint quality itself.

The best basis for specifications is the use of those formulations which have proved their durability in actual service. To attempt a paint specification without restriction on composition, reliable short term tests must be carried out on the following characteristics: (1) expected durability; (2) adhesion and retention of adhesion; (3) storage life; (4) moisture vapor permeability; (5) consistency (or some measure of suitability for application); (6) ability to restrain corrosion; (7) retention of appearance. While it is true that much work has been done on the measurement of these various characteristics, considerable research is still necessary before adequate protective

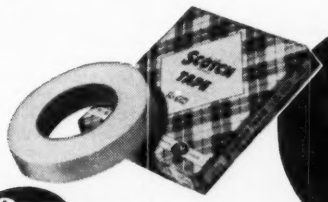


PLATING INSIDE SURFACES of stacked aircraft bearing shells. "SCOTCH" Pressure-Sensitive Tape No. 470 withstands hot caustics, strong acids and alkalies, cold water rinses at 35° F.

Plating rejects cut 85% with plastic tape

Plating rejects are now only 2% of volume at Cleveland Graphite Bronze Co., Cleveland, Ohio. "SCOTCH" Pressure-Sensitive Tape No. 470 has practically eliminated defective plating caused by usual insulating methods. Speed of tape application and removal has boosted production.

Why not have one of our experienced tape engineers show you how "SCOTCH" Pressure-Sensitive Tapes can save you time and money on your finishing problems? Write Dept. PF-1049 for further information. No obligation.



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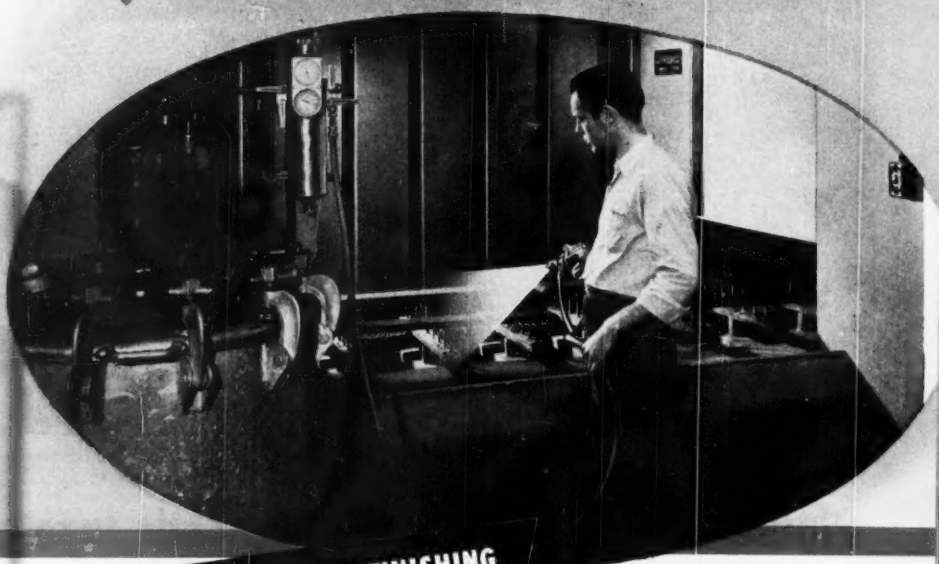

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The simple turntable is an important feature in many spray booths. Fatigue, costly rejects and production bottlenecks are often reduced with the addition of this common item.

Reaching all sides and surfaces of objects being sprayed sometimes presents a tricky problem. Stumbling over air and fluid hoses to get at all surfaces within the spray booth is almost certain to irk the operator and spoil work. These difficulties are bottlenecks in good production. They slow down the worker and cause needless fatigue. A turntable of the proper type for the job solves many problems and increases the efficiency of your paint department. With a turntable, all sides of the work are within easy reach of the operator saving countless steps, pulling, tugging or lifting operations. And besides, runs, sags and other defects caused by uneven paint application are often prevented by the use of this simple device.

Selection of the proper turntable for your type of job will provide many production advantages. Aside from the prime necessity of choosing a turntable of ample load bearing capacity and size, there are other features to consider. Air lift turntables dispose of awkward reaches by elevating the work to whatever level is most convenient. They do away with lifting heavy objects by hand, allowing the operator more time and energy for the actual job of spraying. These turntables are often operated by a foot control to leave the hands free. Models with an adjustable tilting arrangement are especially suited for many objects. The tilting principle is advantageous when spraying cavities or angular planes. By tipping and rotating the table the operator is not forced to hold the gun in an awkward or tiresome position hour after hour.

It is always best to provide a means of quickly centering objects to be sprayed on a turntable. Otherwise, objects rotated off-center receive a heavier coat in some places than others. Accurate centering eliminates this.

Care and cleaning of the turntable is important if you expect to get best results. The best method of protecting the turntable is to coat it with a fireproof spray shield, which can be easily removed as the paint accumulation builds up.

Because turntables offer such a tremendous advantage in relation to their reasonable cost, every paint department will find the investment well worthwhile.

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paint specifications can be drawn up on this basis. The protective coatings engineer should always keep in mind the principles of mechanical exclusion and chemical inhibition; that is, the fact that paints can afford protection in two ways: (1) the film may exclude, wholly or partially, corrosive influences, such as water, acids, salts, gases and so on from the metal; (2) the paint may contain a constituent which inhibits or stifles the corrosion process, bringing the metal to what has been termed a passive condition. Although passivity itself may depend on a film, there is a fundamental difference between these two modes of protection. A paint containing a protective and inhibitive pigment converts the surface of the metal into a protective film. As a result some degree of porosity in the film can be tolerated, and protection achieved. However, in the absence of inhibitors, protection can only be achieved if the paint itself is reasonably impervious.

Most of the best painting procedures protect in both ways, serving not only to render the metal passive but also to protect it mechanically. It might be argued that, provided the first coat contains an inhibitive pigment, the physical characteristics of the various top coats is a matter of no importance. Such a view would, however, be wrong. If the coats are mechanically weak, they may be removed by abrasion, leaving the metal without any layer of inhibitive pigment to protect it. Thus, there are certain requirements for the physical and chemical characteristics of the outer coat. Most authorities regard it desirable to have the outer coat as nearly waterproof as possible, so that the provision of the inhibitor in the inner coat becomes merely the last line of defense.

Lewis has investigated the power of various pigments to prevent attack under conditions where corrosive

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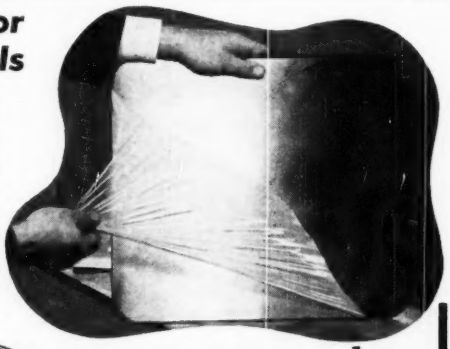

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TABLE I

BEHAVIOR OF PIGMENTS IN THE SCRATCHED-COAT PRIMER TEST WITH 0.001M SODIUM CHLORIDE

Definite Inhibition
(No corrosion at the scratch)

Litharge (2 varieties)
Red lead (3 varieties)
Zinc oxide[1] (4 varieties)
Zinc dust
Blom alloy pigment

Doubtful Inhibition

Lead peroxide
Manganese dioxide
Magnesium oxide (2 varieties)
Magnesium basic carbonate

Definite Corrosion at Scratch

Iron oxide (7 varieties)
Lead oxalate
Lead sulfate
White lead
Lead chromate (2 varieties)
Barium sulfate (2 varieties)
Graphite
Lampblack
Aluminum (2 varieties)
Arsenious oxide (2 varieties)
Antimonius oxide
Stannic oxide
Titanic oxide
Emery flour
Carborundum

[1] *Lithopone* (co-deposited zinc sulfide and barium sulfate) gave much less favorable results than zinc oxide in the tests of E. Maass and R. Kempf (*Korr. Met.*, 1927, 3, 131), possibly as a result of the sulfide content.

agents (water, oxygen, electrolytes, and so on) are deliberately allowed to reach the metal (" J. Soc. Chem. Ind.," 53, 29T, 1934). One method he used was known as the scratch-coat method. In this method, the pigment was mixed with linseed oil, and spread on the steel surface; when the film was dry, a standard scratch was made, exposing the metal, and a drop of 0.001M sodium chloride placed thereon. With precautions against evaporation, all experiments were carried out in a thermostat at 77 deg. F. When the pigment had no inhibitive properties, corrosion soon set in, leading to visible rust, while the paint became softened and rubbed off readily. Several pigments were found to possess sufficiently well-pronounced inhibitive properties to prevent all corrosion, rusting, or softening at the scratch below drops of this concentration (stronger solutions break down the passivity). The results obtained are summarized in Table I.

Whether the incorporation of a corrosion inhibiting pigment in the primer forms a "secondary" or "primary" line of defense is perhaps not important. It is known that certain pigments exert an inhibitive action at the metal interface and definitely promote the retention of adherence. Future progress in paint technology will depend to a large extent on a clearer understanding of these mechanisms and the relations existing between them.

* * *

Nickel Plating at High Current Densities

ONE of the technical highlights of the recent 36th Annual Convention of the American Electroplaters' Society held in Milwaukee, was a paper describing studies conducted in the laboratories of the International Nick-

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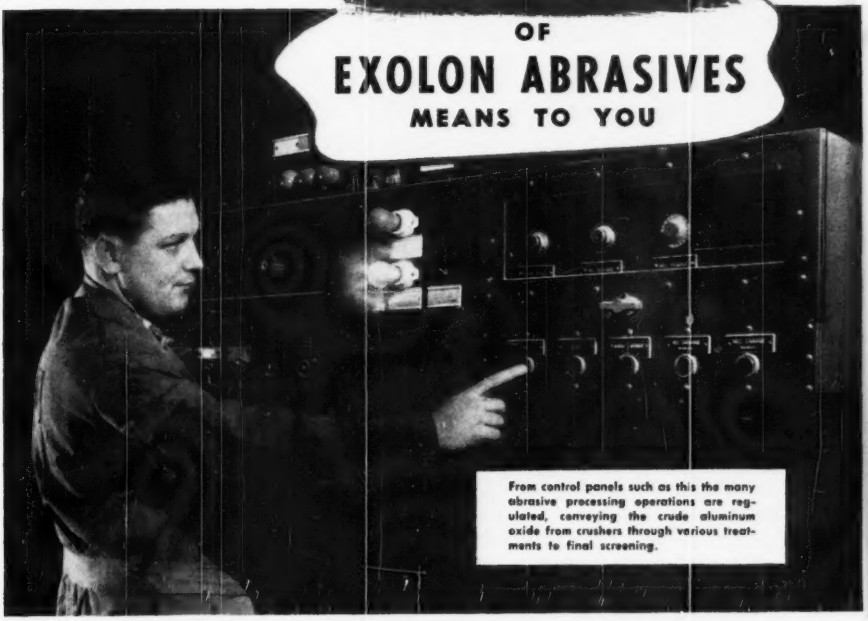

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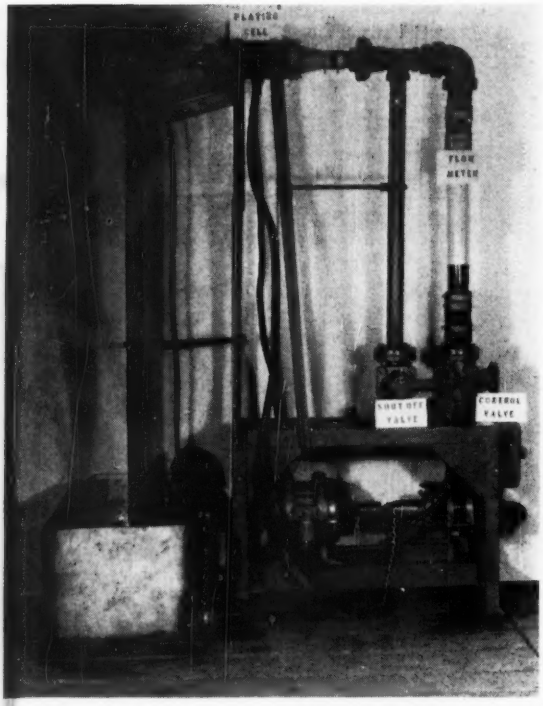

Fig. 1—Controlled flow apparatus used for high speed nickel plating studies conducted in International Nickel Company laboratories and described before the 36th Annual A.E.S. Meeting

el Company on high current density nickel plating, wherein it was brought out that in a controlled flow apparatus sound nickel deposits were actually made at the rate of 0.001 inch in 16 seconds from a chloride-type bath, with high anode and cathode efficiencies. This paper was based on work carried out by W. A. Wesley, W. W. Sellers, and E. J. Roehl and was awarded the Founders Gold Medal of the A. E. S. as the best paper presented to the 1949 Convention. Electrochemical data were presented which should be useful in designing equipment for high speed nickel plating, and even for increasing ordinary plating rates by providing uniform motion.

The theory of limiting current densities was applied to nickel deposition by the above experimenters and led to the conclusion that it is theoretically possible to plate nickel at rates as high as 8500 amp./sq. ft. However, it was pointed out that this figure is so high that the practical limit would be set, not by electrochemical factors, but by such engineering requirements as prevention of overheating of contacts, electrolyte and cathode, maintaining an adequate rate of motion of the electrolyte versus the cathode surface, and so on. Calculations were also carried out which showed that nickel chloride solutions have fundamental advantages over nickel sulfate solutions for high current density work.

Figure 1 shows the controlled flow apparatus for the high speed nickel plating studies which was adopted after a series of preliminary experiments. The electrolyte reservoir at the left is a glass or rubber lined tank large enough to hold the 30 liters of plating solution normally circulated. Here, the temperature and pH of the bath were maintained constant, and here also was applied electrolytic low current density purification of the bath between experimental runs. Passing through a two-inch hard rubber pipe to the glass centrifugal pump at the lower right (Fig. 1), the electrolyte was then pumped vertically through a large rotameter.

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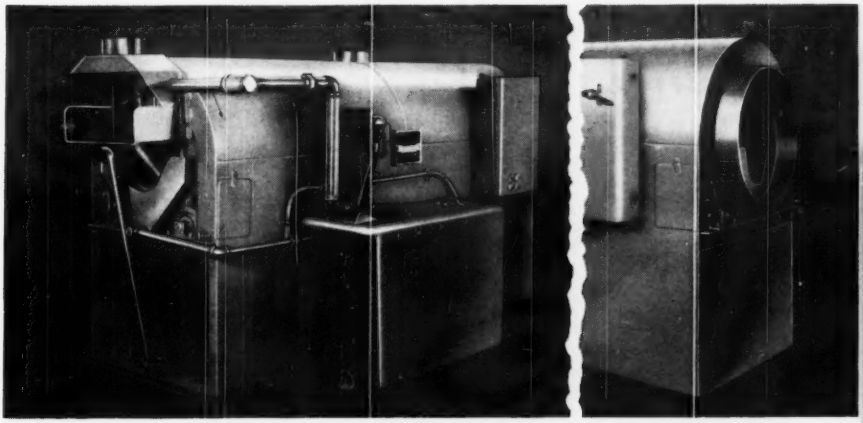

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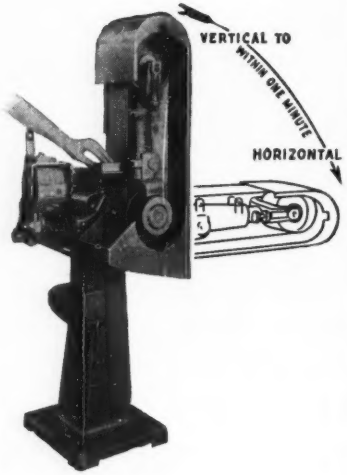

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The plating cell used in the studies was made of machined hard rubber parts with slots to support an anode and a parallel cathode precisely one-quarter inch (0.64 cm.) apart. Streamlined entrance and exit channels were provided so as to insure as uniform a flow of electrolyte as possible. It was pointed out that the cross section of the electrolyte stream was almost exactly 2 inches high by one-quarter inch thick, so that a rotameter reading of 1 gal./min. corresponded to a flow rate over the cathode and anode surfaces of 38.5 ft./min. Pressed against the outer surface of the cathode was a heavy contact plate of nickel to which electrical connection was made by means of a heavy bolt through the cell wall. The long dimension of the electrodes was horizontal and the 2-inch dimension vertical. The outlet end of the cell was readily removable; the cathode was inserted and removed from this end. It was brought out by the experimenters that the apparatus used resembled a similar apparatus that has been used for study of high speed tin plating on strip steel, although the two were designed independently.

The experiments were conducted with two types of baths, namely, the chloride type nickel bath and a Watts-type bath. The former was of nominal composition of 300 gm./l. nickel chloride, plus 30 gm./l. boric acid, while the latter contained 330 gm./l. nickel sulfate, 45 gm./l. nickel chloride, and 30 gm./l. boric acid. Both baths were given a high pH treatment for removal of iron, a treatment with activated carbon to remove organic matter, and were worked at low current density to remove inorganic impurities. As a result of studies with these two types of baths, it was concluded that the Watts bath suffers serious disadvantages in comparison with the chloride bath for plating at very high current densities, namely poor anode behavior, high elec-

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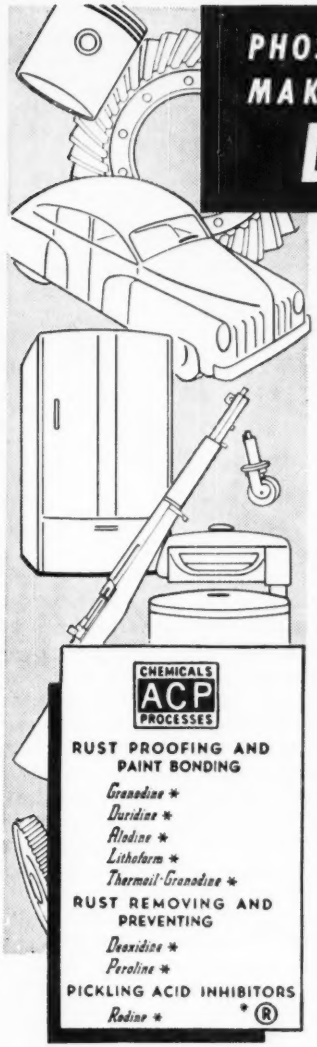

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TABLE II

LIMITING CURRENT DENSITIES FOR SOUND NICKEL DEPOSITS

Based on Data Collected in International Nickel Laboratories

Temperature: 160 deg. F.
pH: 2.0

Flow Rate of Electrolyte ft./min.	Chloride Bath Thickness inch	Chloride Bath Sound Deposits at a.s.f	Chloride Bath Unsound Deposits at a.s.f	Watts Bath Thickness inch	Watts Bath Sound Deposits at a.s.f	Watts Bath Unsound Deposits at a.s.f
10	.001	400	500	.001	350	400
				.003	300	350
50	.001	600	700			
100	.001	1100	1200	.003	800	900
300	.001		3000		x	
350	.004	3000				
400	.001		4000		x	
500	.005	4000				
750	.001	4200			x	

x—Not determined due to anode difficulties.

trolyte resistivity (that is, high tank voltage), and a lower limiting current density for sound deposits.

In studying the limiting current density, the procedure used was to plate a series of deposits at a constant rate of flow, but at increasing current densities until unsound deposits were obtained. In this connection, it was stated that burned, streaked, or spongy areas on the plate were considered evidence of unsoundness. Also, it was brought out that at the highest flow rates of 1055 and 750 ft./min., the limiting current density could not be reached because 4200 amp./sq. ft. was the current density obtained at the maximum available voltage.

The results on the practical limiting current density for nickel plating under these conditions are given in Table II. When the results were represented graphically it was shown that the relationship between the practical limiting current density and solution flow rate is at least approximately a linear one. Among the conclusions drawn from the work was that the limiting current density for sound nickel deposits increases approximately linearly with the rate of flow of electrolyte over the cathode surface. With a flow rate of 750 ft./min., sound nickel deposits were obtained at cathode current densities as high as 4260 amps./sq.ft. in the chloride nickel bath. It was also shown in the experimental work that, at the limiting current densities, both anode and cathode efficiencies were still approximately 100 per cent. These data are given in Table III.

Concerning the character of the deposits, data were presented to show that nickel coatings prepared at very high current densities were less ductile and slightly harder than those made from the same solution at normal rates. Tests were also conducted which showed that the protective value of nickel coatings is not significantly lowered by increasing the current density. For example, panels made from the Watts-type bath at 800 amp./sq.ft., were somewhat superior to 50 amp./sq.ft. panels in resistance to atmospheric corrosion and the salt

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TABLE III

ELECTRODE EFFICIENCIES AT HIGH CURRENT DENSITIES

Temperature: 160 deg. F.
pH: 2.0
Efficiency calculated from changes in weight of electrodes.

Bath	Flow Rate ft./min.	Current Density a.s.f.	Time to Deposit .001 in. sec.	Anode Efficiency per cent	Cathode Efficiency per cent
Chloride	50	600	115	98	96
	100	1100	63	104	100
	750	3000	23	99	100
	1055	4260	16	100	
Watts	10	300	230		99
	100	800	87	98*	102
				104**	

* Electrolytic nickel
** Wrought carbon-bearing nickel

spray test.

From the standpoint of commercial nickel plating operations, the point was brought out that with a measured electrolyte flow rate of 10 ft./min., the limiting current densities were 400 and 300 amp./sq.ft. for the chloride and Watts bath, respectively. Thus, even at this flow rate it should be possible to double present average nickel plating rates.

* * *

Monel Metal Useful as a Material of Construction for Metal Pickling

HOT sulfuric acid solutions commonly are used for pickling oxide scales from steel or steel parts which have been hot rolled, forged, or otherwise heat treated. Acid concentrations normally are 5 to 15 per cent by weight and temperatures 140 to 200 deg. F. Organic inhibitors sometimes are added to prevent too rapid an attack on the steel. According to data recently brought out by the International Nickel Company, because of its good mechanical properties and resistance to corrosion by these pickling solutions, Monel metal has for years been a standard material for construction of crates, racks, baskets, chains, hooks, and other parts holding the steel to be pickled; for bolts, nuts, stay-rods, and other parts supporting wood pickling tanks; for heating coils and in some cases for solid or lined pickling tanks.

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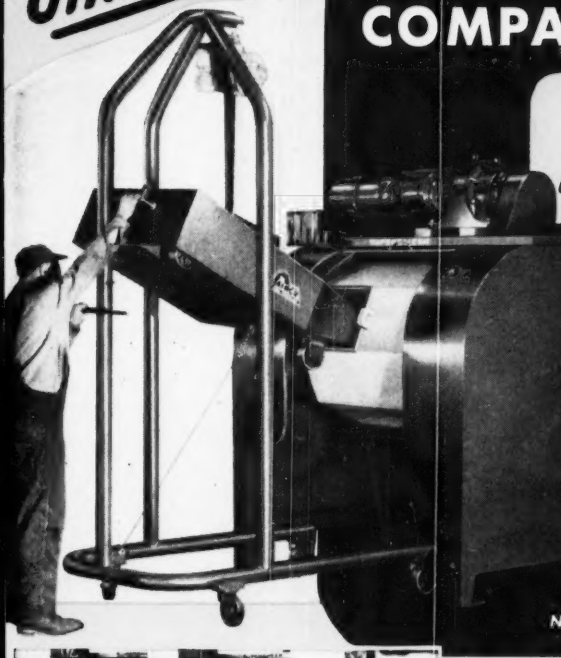

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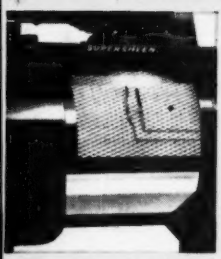

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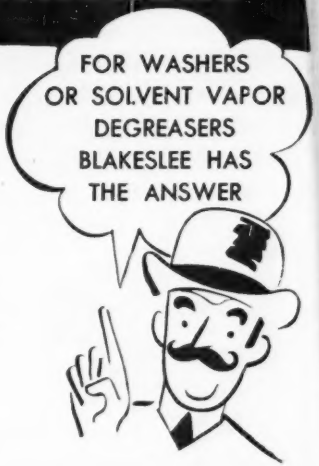

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steps in the process through which the equipment passes. The copper content of Monel is low enough that copper-flash is avoided when it is used for racks or crates in the pickling of steel for enameling or other finishing operations.

Sulfuric acid solutions are also used in the pickling of fabricated brass and copper parts and in the continuous pickling of brass and copper strip and sheet. Acid concentrations and temperatures vary somewhat more than in steel pickling and depend upon the thickness of oxide film or scale to be removed. Concentrations may range from 5 to 20 per cent and temperatures from atmospheric to 180 deg. F. During pickling, the sulfuric acid solution dissolves copper from the product and gradually accumulates a copper sulfate content. Where ordinary immersion pickling processes are used and no oxidizing chemical is added to the solution, experience has shown that Monel baskets and crates are satisfactory for handling the brass parts during such finishing processes.

However, in the flash or bright pickling of brass parts, oxidizing salts such as dichromates or nitrates, or nitric acid may be added to the sulfuric acid solutions. Under such highly oxidizing conditions, Monel and nickel are subject to rapid attack. Inconel and other nickel-chromium alloys are generally used for dipping baskets. The nickel-chromium molybdenum-iron alloys usually are resistant and are used for pumps, valves, and other parts. Type 316 stainless steel pickling tanks frequently are used under these oxidizing conditions. It has been pointed out that this alloy may sometimes be subject to localized corrosion in crevices where oxidizing conditions do not penetrate; therefore crevices should be avoided in the design of such tanks.

* * *

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Hardness of Electroplated Chromium

IMPORTANT data of practical value to the chromium plater were presented before the 36th Annual Electroplaters' Society Convention on the hardness of chromium electrodeposited under a wide variety of conditions in a paper by J. M. Hosdowich, United Chromium, Inc. Hardness means different things to different people. However, to the chromium plating engineer, it is the thing that makes a chromium plated roll give long service. It was brought out by Hosdowich, that hardness is not a single property. It is a composite of properties. Everything considered, the ideal method of determining the hardness of a material would be to test it in a machine designed to simulate the particular conditions which the material will have to withstand in service.

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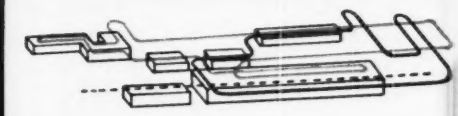
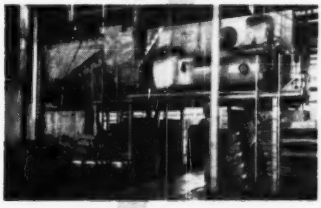
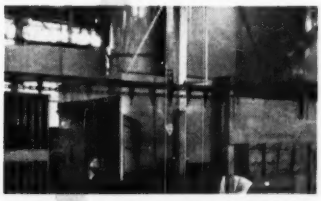


It takes less than one-half minute to spray a wheel or rim in this enclosed water wash spray booth.



Overhead installation of this parts dry-off oven allows for extra working area.



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4 WATER WASH SPRAY BOOTHS are enclosed and supplied with heated and filtered outside air from two air make-up systems.

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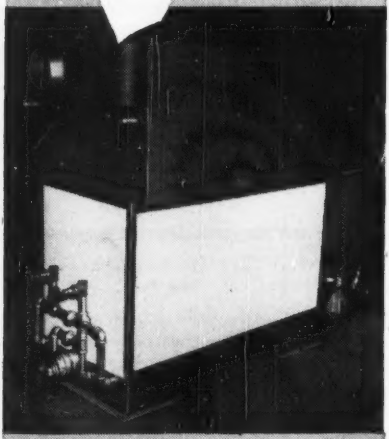

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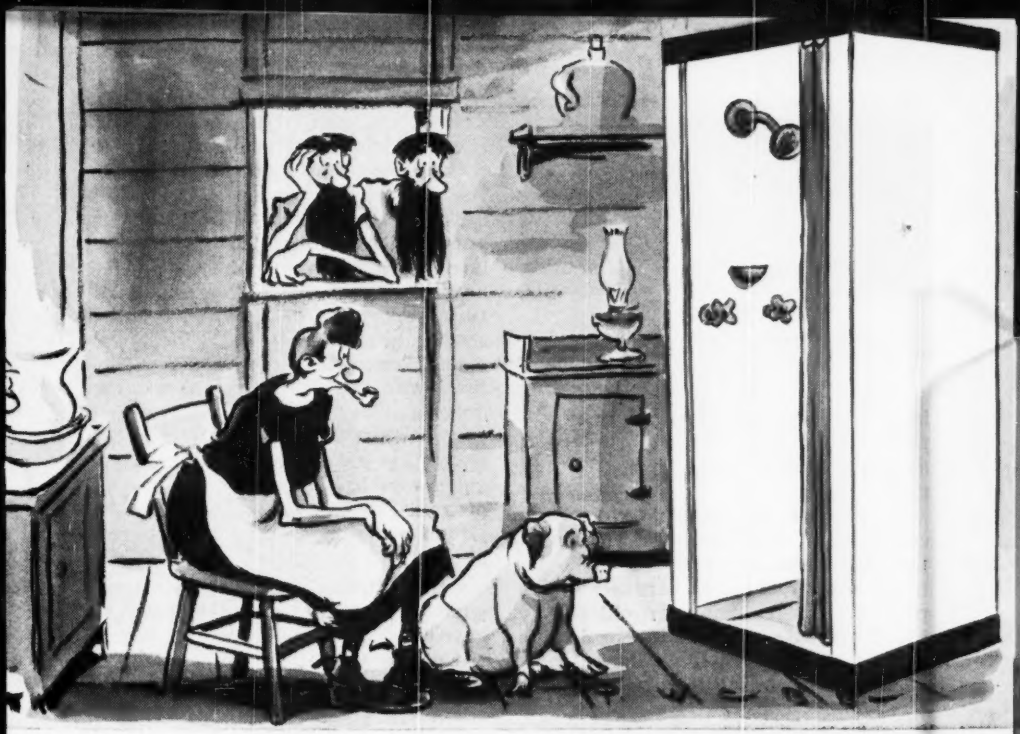
In the United Chromium laboratories the scratch hardness of chromium electrodeposited under a wide range of conditions was determined by means of the Bierbaum Microcharacter. The abrasion hardness of the electrodeposited chromium was determined by means of an automatic machine in which a grinding wheel was intermittently brought in contact with the test piece. Based on the work conducted, a conclusion of practical value to the chromium plater is that both the scratch hardness and the abrasion hardness of any chromium deposit can be accurately estimated from its appearance—regardless of the temperature and current density under which it was deposited. Matte deposits were found to be softest by both test methods; bright deposits hard by both methods; frosty and burnt deposits were still harder by the scratch method but softer by the abrasion method.

The Bierbaum Microcharacter is an instrument for making a scratch with a diamond point under a constant load. The hardness is determined by measuring the width of the scratch under the microscope. The polished and lubricated surface being tested is moved by a micrometer feed under a diamond point bearing down with a constant pressure. The diamond is ground to the shape of the corner of a cube, and mounted on a spring so that the diagonal of the cube is normal to the test surface, and one edge faces the direction of the motion. The pressure is produced by a small weight, generally 3 to 9 grams, supported by the diamond point. The scratch widths were measured on the ground glass of a Leitz metallographic microscope, Model MM, by means of a pair of dividers and a millimeter scale. Hosdowich stated that in the experiments, a magnification of 1000 diameters was selected so that the measurement of the image in millimeters was the same figure as the actual scratch width



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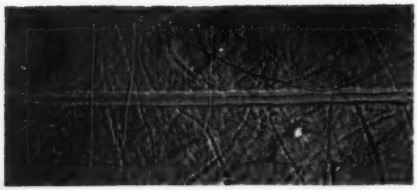

Fig. 2—Unpolished bright chromium deposit showing scratch measuring 4.07 microns (1000X)

in microns. Shown in Fig. 2 is an unpolished bright chromium deposit showing scratch measuring 4.07 microns.

A number of factors involved in commercial conditions for electrodepositing chromium were studied to determine their effect on hardness of the plate produced. Shown graphically in Fig. 3 are data collected by Hosdowich on the relationship between current density and scratch hardness of electrodeposited chromium at 45, 55, and 65 deg. C. using the commercial type 250 gm./l. chromic acid plating bath. The data show that as the current density increases, the hardness increases rapidly, then levels off at about 1000 Brinell, and then increases slowly. The range of constant hardness increases with increase in temperature. The deposits having the lowest hardness were described by Hosdowich as milky in appearance; those at the 1000 Brinell level were bright or frosty; and the hardest deposits were rough or burnt. Data reported on the commercial 400 gm./l. chromic acid plating bath were similar except that the 1000 Brinell level was found to start at a higher current density. Additional work was carried out which showed that, in general, the hardness of electroplated chromium is correlated with the appearance of the deposit and not with either temperature or current density alone.

Other studies carried out by Hosdowich which are of interest to the chromium plater included an investigation of the effect of varying the chromic acid to sulfate ratio on the hardness, which showed that there is no apparent difference in the scratch hardness of chromium deposited from solutions having ratios of CrO_3/SO_4 equal to 75/1, 100/1, or 150/1. Additional tests showed that the presence

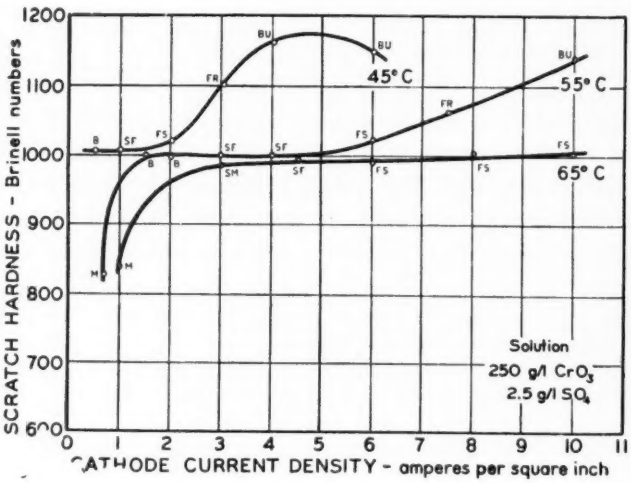

Fig. 3 — Curves presented at 36th Annual A.E.S. Convention based on work conducted by United Chromium, Inc., showing relationship between current density and scratch hardness of electrodeposited chromium. The 250 gm./l. solution was studied at temperatures of 45, 55, and 65 deg. C.
LM—light gray matte
DM—dark gray matte
M—milky
SM—slightly milky
B—bright
SF—slightly frosty
FS—frosty-smooth
FR—frosty-rough
BU—burnt

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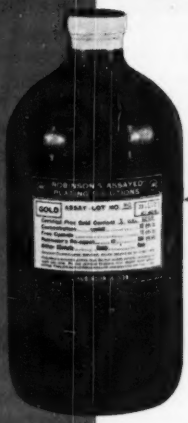

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of 5, 10, or 25 gm./l. trivalent chromium, or iron contamination of the bath does not affect the scratch hardness of the chromium deposit.

In testing the abrasion hardness, Hosdowich used a machine involving a slowly rotating emery wheel. Its cutting, indenting, and shearing action approximates the type of wear to which many applications of chromium plate are subjected. The results of abrasion hardness studies made using the commercial 250 gm./l. chromic acid plating bath showed that the maximum abrasion hardness was obtained at 45, 55, and 65 deg. C. in the slightly milky, bright, and slightly frosty plating range. Also, it was found that the current density range for maximum abrasion hardness becomes greater as the temperature increases. The matte deposits were found to have a low abrasion hardness. As the deposits become frosty and burnt, the abrasion hardness decreases, whereas the scratch hardness continues to increase. The abrasion hardness data found for the commercial 400 gm./l. type bath were found to be similar to the values found for the 250 gm./l. bath, except they were shifted in the direction of higher current density.

According to recommendations made before the convention group by Hosdowich, there is no need for a plater or engineer to run hardness tests on chromium plated parts in production. Many such tests are influenced more by the hardness of the base metal than by the hardness of the chromium plate. Thus, so long as the chromium plate comes out of the plating solution bright or slightly frosty in appearance, it has a hardness equivalent to about 1000 Brinell. If a bright chromium plate appears to be "soft", it may be because the base metal is too soft and the chromium deposit too thin.

* * *

Surface Treatment for Magnesium

ACCORDING to a report by L. Whitby in a recent issue of "Metallurgia," London, the addition of sodium dichromate to selenious acid baths provide a surface treatment for magnesium that compares favorably with standard chromate and selenium coatings from the standpoints of both salt-spray resistance and effectiveness as a paint base. The coating composition is primarily selenium, but chromium, probably as a partially-soluble chromate, is also present and is thought to account for the improvement in coating properties.

The bath recommended is an aqueous solution of 7.5 per cent sodium dichromate plus 3 per cent selenious dioxide used at its boiling point. A 5 minute immersion is recommended for the alloy corresponding to Dowmetal M, followed by mechanical re-

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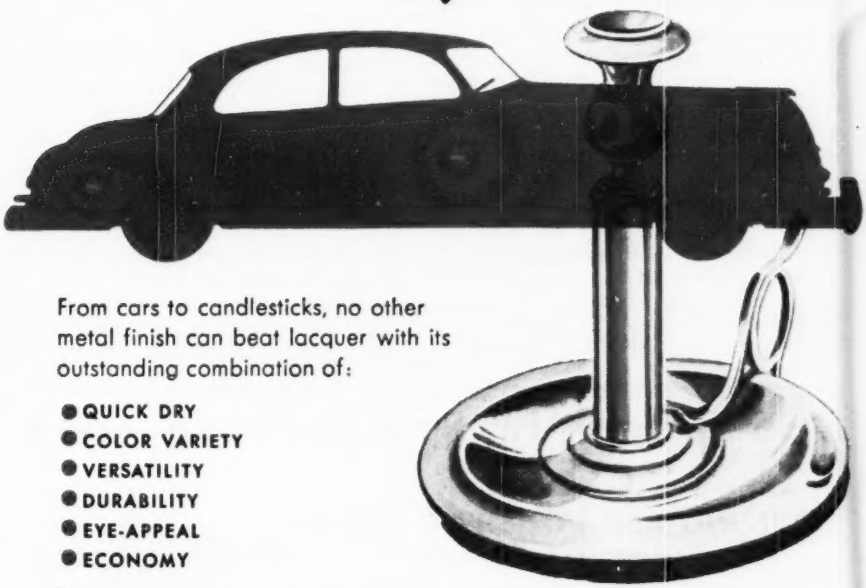

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moval of the surface layer if the material is to be painted. Life of the solution was stated to be exceptionally long; and, for the alloys tested, the coatings were said to be odor-free.

* * *

Salt-Bath Chromizing Produces Corrosion Resistant Coatings

WORK carried out at Battelle Memorial Institute and reported at the 95th Convention of the Electrochemical Society has resulted in an improved method for production of chromized corrosion resistant coatings on a variety of ferrous materials. According to data presented in a paper before the meeting by L. E. Campbell, V. D. Barth, R. G. Hoechelman, and B. W. Gonser, of Battelle, chromizing by the new process is obtained by simply immersing the work in a fused salt bath containing chromous chloride. It was pointed out that this is a more flexible process than is the present process for chromizing by the pack process in which a chromium-containing mixture is packed around parts in a tubular furnace, and the charge heated to 1300-1400 deg. C. in a hydrogen atmosphere.

In the chromizing of steel, chromous chloride reacts with iron to form a chromium-iron alloy at the surface. The surface of a chromized part, as ordinarily prepared, is never pure chromium, but is of the order of 40-70 per cent chromium. The concentration gradient beneath the surface drops to about 13 per cent at the interface between the case and base metal. It was pointed out by the Battelle workers that since only the surface of a corrosion resistant alloy is effective in opposing destructive attack, there are many instances in which ordinary iron or steels having a protective high-chromium alloy surface are as satis-

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Table IV

	Shape	Chromizing Temperature
Armco iron	3/16"-diam. rod	900°, 1000°, 1100°, 1200° C.
Armco iron	1/16" sheet	1000° C.
1. S.A.E. 1015 steel	1/4" x 1/4" bar	1100° C.
2. S.A.E. 1045 steel	Ditto	Ditto
3. S.A.E. 2315 steel	"	"
4. S.A.E. 3140 steel	"	"
5. S.A.E. 4120 steel	"	"
6. S.A.E. 4130 steel	"	"
7. S.A.E. 5115 steel	"	"
8. 2.0% Mn, 0.15% C, 0.8% Si steel	3/16"-diam. rod	"
9. 1.5% Mn, 0.08% C, 0.4% Si, 0.64% Ti "IK" type steel	1/4" x 1/4" bar	"
10. 18-8 type 347 stainless steel	3/16"-diam. rod	1200° C.
11 3.3% C, 1.7% Si, 0.8% Mn cast iron	5/16"-diam. rod	1035° C.
12. 3.4% C, 1.9% Si, 0.8% Mn cast iron*	5/16"-diam. rod	1035° C.
13. Nickel	1/4"-diam. rod	1200° C.
14. Molybdenum	5/64"-diam. rod	1200° C.
15. Tungsten	5/16"-diam. rod	1200° C.

* Partially decarburized to depth of 8 mils.

Materials which were chromized in the experimental work carried out at Battelle Memorial Institute. (*Courtesy Electrochemical Society*)

factory from a performance standpoint as a continuous "stainless steel" structure.

The primary salt-bath composition used in a majority of runs consisted of the following mixture:

30 per cent chromous chloride
40 per cent barium chloride
21 per cent sodium chloride
Sufficient chromium flake to cover the crucible bottom.

An argon atmosphere was provided to shield the bath against air. The experimental work included determinations of comparative case formation in the above bath and variations were made in both the bath composition and atmosphere. Some work on pack chromizing was also carried out to provide a basis for comparison with the salt bath method. Table IV lists the metals and alloys chromized in the experimental furnace at Battelle.

The Battelle workers reported that none of the chromized parts listed in Table IV failed to pass the nitric acid test. This test consisted of immersion of the specimens in a 1:2 concentrated nitric acid, water solution at room temperature. Specimens having continuous cases were unaffected in a 3 to 4-month test period. Those having slight porosity or excessively thin cases failed within a few hours. It was reported that continuous cases as thin as 0.2 mil held up over tests of several months duration. A steel salt-bath chromized part that was examined metallographically is shown in Fig. 4. The effect of time and temperature on thickness of case during salt bath chromizing of Armco iron is shown in Fig. 5. In general, case thicknesses for steel were less than for iron, since as pointed out in the report, the presence of carbon sharply restricts the rate of

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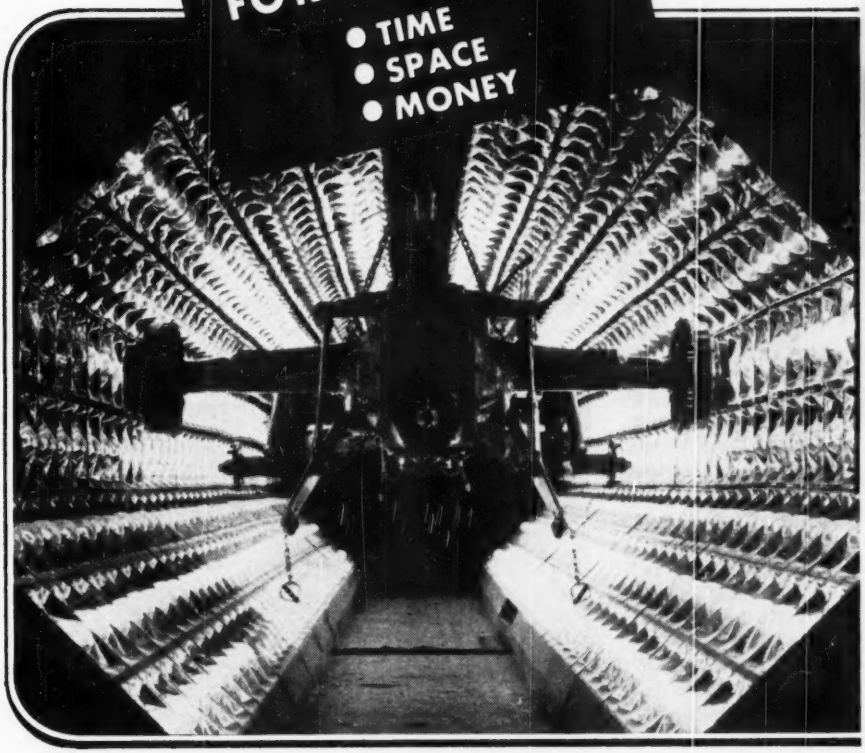

EVENRAY INSTALLATION AIDS STREAMLINED PRODUCTION. Harry Ferguson, Inc., Detroit, utilizes a 64-foot Fostoria Evenray paint baking oven with a capacity of 250 assemblies in eight hours—to keep pace with the new assembly plant's production basis of a completed farm tractor every 115 seconds.

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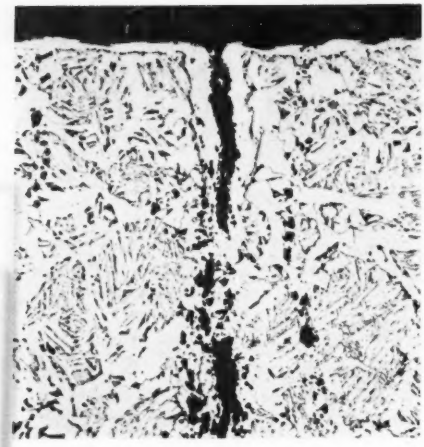

Fig. 4—S.A.E. 5115 steel, salt bath chromized at 1100 deg. C. (2000 deg. F.) showing penetration into defect. 100 X. Nital etch. (*Illustration courtesy Electrochemical Society*)

case growth.

In a number of runs cast iron was found to chromize without difficulty, a uniform corrosion-resistant one-mil case being formed in 3 hours at 1035 deg. C. The effect of excessive carbon is partially offset in the case of cast iron by its lower melting point.

Advantages of the salt bath method of chromizing which were cited in the report include such factors as greater latitude in chromous chloride concentration during treatment, elimination of packing and unloading operations and furnace heating and cooling, and the possibility of chromizing, simultaneously, articles requiring different periods of treatment. It was pointed out that the rate of chromized case formation in the salt bath method is dependent upon two processes: (1) an exchange reaction, whereby chromous chloride reacts with iron to form a chromium-iron alloy and ferrous chloride, and (2) the inter-diffusion of chromium and iron. In salt-bath chromizing with a high chromous-ion activity, the limiting factor is the diffusion process, and the exchange process can, for practical purposes, be assumed to be instantaneous. Futhermore, since the diffusion rate is an exponential function of the temperature, the rate of case formation increases rapidly with a small temperature increase.

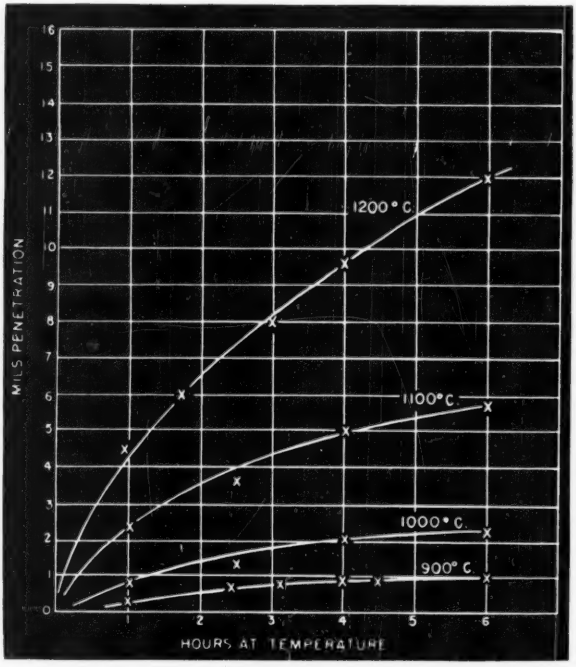

Fig. 5—The effect of time and temperature on thickness of case during salt bath chromizing of Armco iron based on work carried out at Battelle Memorial Institute (*Illustration courtesy Electrochemical Society*)

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NON-FUMING — No fumes — no acid spray! Creates better and healthier working conditions — minimizes corrosion of auxiliary equipment.

NON-SCUMMING — Absence of sulfur fumes from pickle room eliminates a definite cause of scumming in the burning atmosphere and on finished ware.

FREE-RINSING — Leaves no objectionable films — may be used with or without nickel immersion dips — easier to neutralize than conventional acids.

VERSATILE — Easily controllable by temperature and concentration — produces any desired etch on conventional enameling irons — cold rolled steel — or the new alloyed enameling irons.

ECONOMIC — Resists buildup of dissolved iron — Outlasts sulfuric acid by wide margins — demands less maintenance of solution and equipment.

Write for Free Technical Bulletin

Manufactured by the originators of

ANODEX
METEX
METALEX
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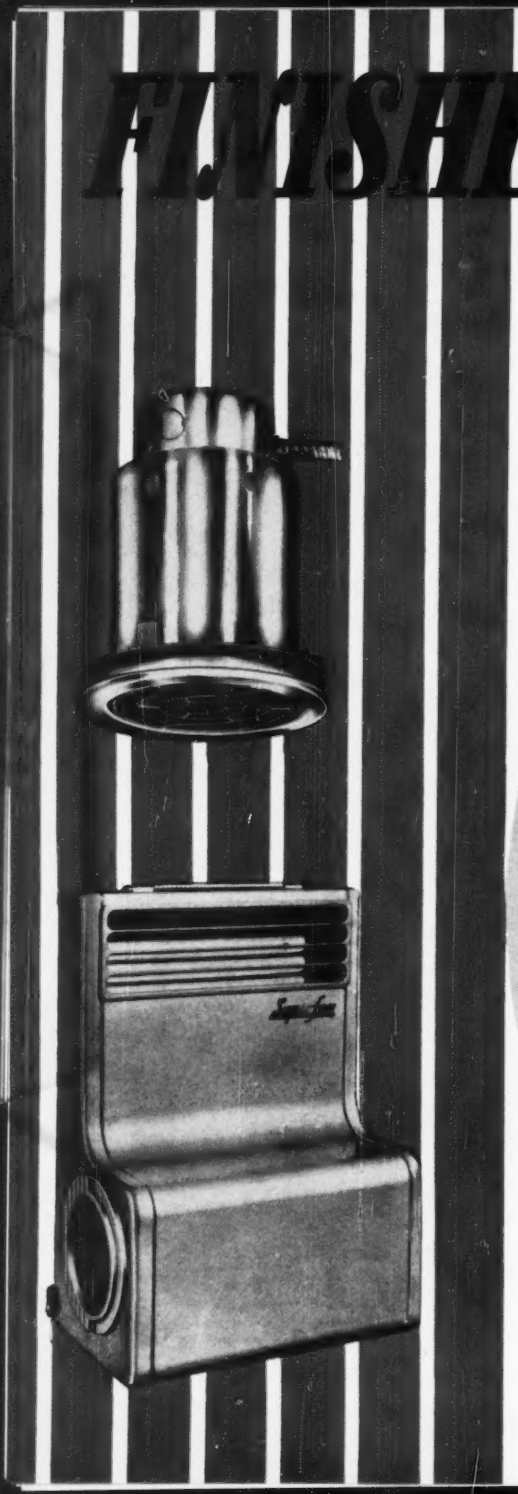
COMPOUNDS AND EQUIPMENT FOR METAL FINISHING

MAC DERMID

★ *Incorporated* ★

WATERBURY 88, CONNECTICUT

FINISHES *that aid*



● A lighting fixture especially designed for mounting in recessed ceilings is the "Standard" Top-Lite illustrated here. Its steel body is finished in infra-red baked aluminum lacquer.

(Photo courtesy Swivelier Co., Inc., New York 3, N. Y.)

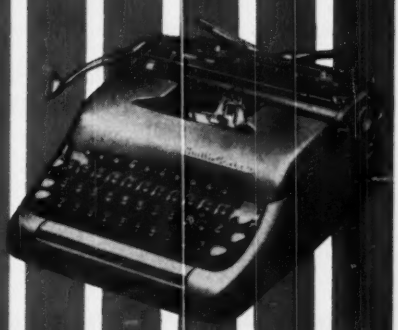
● The "Superfan" portable forced-air circulator is finished in Hammertone Moore Tan Alpo baking enamel, in two harmonizing shades.

(Photo courtesy Queen Stove Works, Inc., Albert Lea, Minn.)

in appearance and utility

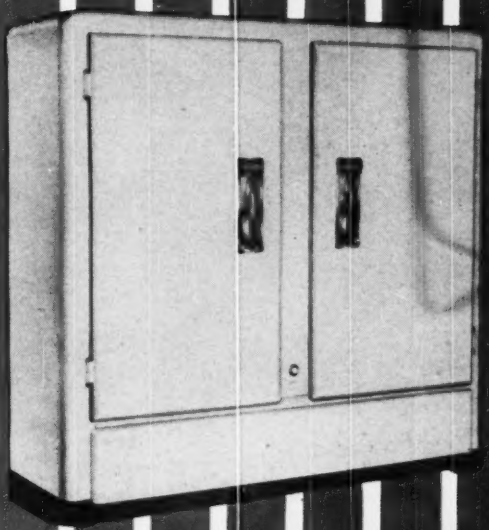
● The 1950 Smith-Corona portable typewriter features an outside finish of beige wrinkle enamel, with chromium plated carriage return, type guide, bail, and operating levers. Interior parts, such as the frame and supporting members, are nickel plated to prevent rust and facilitate servicing by providing contrast between the plated and black parts .

(Photo courtesy L. C. Smith & Corona Typewriters, Inc., Syracuse 1, N.Y.)



● The all-steel food freezer shown here is finished inside and out with two coats of white baked enamel over Bonderized steel. Chromium plated hardware and trim add attractiveness to the finished product.

(Photo courtesy Carrier Corp., Syracuse 1, N.Y.)



PRACTICAL APPLICATIONS *of Modern Products*

Flexible Automatic Polishing and Buffing Machines Speed Automotive Trim Finishing

BECAUSE of the variety of parts that must be processed in a job plating shop catering to the automotive industry, automatic polishing and buffing machinery must be not only efficient but also highly flexible. Illustrative of equipment of this type is the Acme automatic polishing and buffing equipment installed in the plant of Advance Plating Company, Inc., Detroit, for processing stainless steel reveal moldings and steel bumper guard extensions.

Stainless steel reveal moldings for automobile windshields are polished and buffed on roller feed units shown in Fig. 1, which while not automatic in

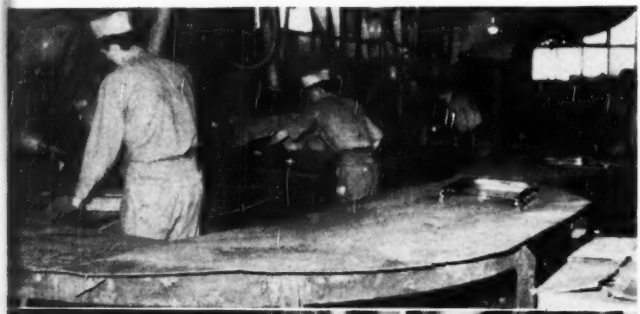


Fig. 1 — An overall view of the equipment assembled to buff stainless steel reveal moldings

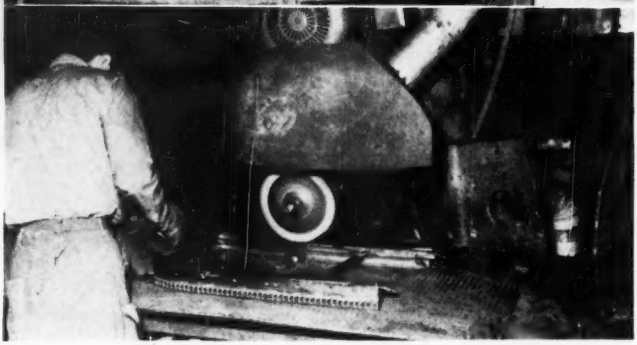


Fig. 2—This operator is guiding a molding carrier under the buff during the final buffing operation. A sprocket located opposite the floating guide roller shown directly below the buff meshes with the chain on the fixture to aid the operator in keeping the molding properly positioned.

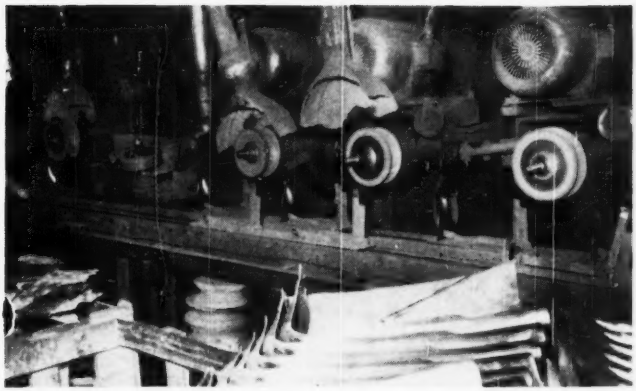


Fig. 3 — Operator at left loads the bumper guards on the fixture holding platens attached to the table-type polishing conveyor. Another operator unloads the polished guards into the shop truck shown in the right foreground of the photograph.

the strictest sense of the term, still offers advantages not found in the usual manual operation. Four ventilated-buff type buffing wheels are employed. Moldings are attached firmly to chain-drive racks and progress around the setup shown, returning when completed to the starting point so that loading and unloading can be accomplished by one operator. Two adjustable floating head lathes with V-belt drive run the buffs at 3400 r.p.m. Two distinct buffing operations are required, the only difference between them being the buffing compound used. For the first operation, a cutting operation, the compound used is not quite as dry as the one used for the second or coloring operation. Both Buckingham and Formax stainless steel buffing compounds are used. Figure 2 is a view of the final coloring operation, showing how the molding rack is guided between a gear and a cam or roller so as to be located properly under the buff.

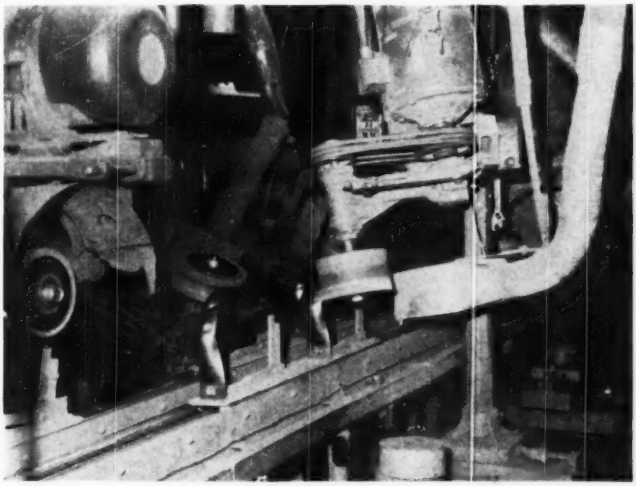


Fig. 4—This view of the automatic polishing machine shows several positions in which polishing wheels may be mounted. Exhaust hoods are located as near the wheels as possible.

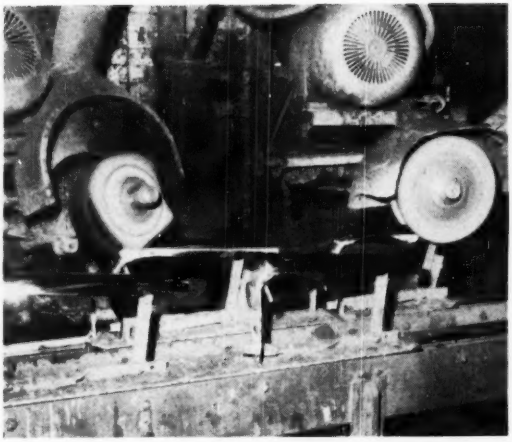


Fig. 6—A close-up view of two buffing heads on the automatic buffing machine
(PRODUCTS FINISHING Staff Photos)

Extension bumper guards are polished on a full automatic horizontal return type straight line machine. The setup consists of the horizontal, power-driven conveyor and 14 Acme pedestal-mounted buffing heads driving polishing wheels adjusted to seven different positions. Figures 3 and 4 are views of the polishing conveyor. Bumper guards, mounted on platens, are polished successively by wheels set up usually in 120 emery and 150 emery. When hot-rolled steel parts are polished, it may be necessary to start with an 80-emery operation. Mr. Frank Tresnan, manager of Advance Plating Company, points out that it is more efficient to change polishing wheels, re-rack the guards, and run them back through the machine for the final oiling-out operation than to extend the conveyor and add seven more polishing wheels to the line. The Acme polishing setup is entirely flexible in this respect; the conveyor can be extended or shortened as desired and additional polishing heads added. Further, the conveyor speed is adjustable so that the production rate can be varied as required. For the 120-150 emery operation, the conveyor is set at 15 ft./min.; for the oiling operation it is set at 20 ft./minute.

A further flexibility secured with the equipment in use at Advance is that the machines can be converted from polishing machines to buffing machines as

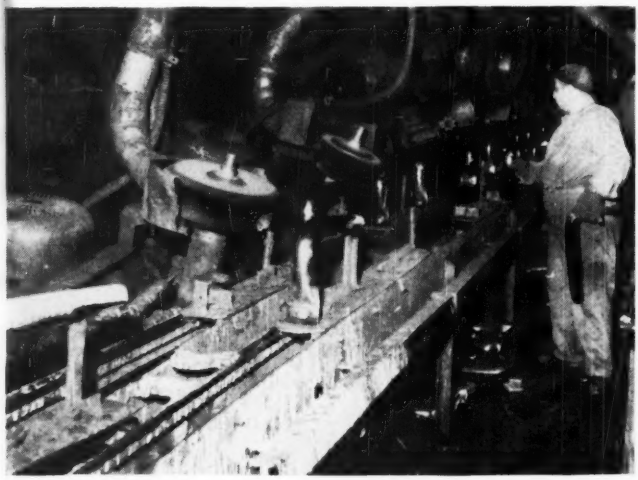


Fig. 5—One operator both loads and unloads the automatic straight line machine. Bumper guards in center foreground have just been loaded. Guard at extreme left has just shifted around the return end in the conveyor and is starting back along the line of buffs.

Start Clean...

Stay Clean!

Use Red Label DARCO S-51 In Your Plating Bath Regularly To Get Better Work At Lower Cost!

Don't run the risk of wasting the time, labor, and expense involved in cleaning work for plating by putting that work into a dirty plating bath! *Start* clean . . . *stay* clean! Use Darco S-51 to trap the trouble-making impurities that ordinary filtration fails to catch. Darco S-51 absorbs these impurities to its surfaces before they can be deposited on the freshly cleaned surface of your work. You get better work at lower cost in bright nickel, copper, iron, zinc, cadmium, tin, gold and silver solutions.

Red Label Darco S-51 is especially treated for use in plating—*it is the only carbon that will meet the benzol-mercury* test! Darco S-51 is especially easy to handle . . . to wet . . . and to incorporate into a slurry. What is more, Darco technicians are ready to show you how to make the most of Darco's advantages. Place an order for Red Label Darco S-51 with your regular plating supply house today — practically all leading suppliers carry it in stock. DO NOT ACCEPT SUBSTITUTES.

Is your plating bath as clean as the water in your final rinse?

DARCO CORPORATION

60 East 42nd Street, New York 17, N. Y.

required by the ever-fluctuating work load in the shop.

Final oiling is performed using 180 emery set-up wheels and 180 emery cake. A sisalin buff is used for the final operation.

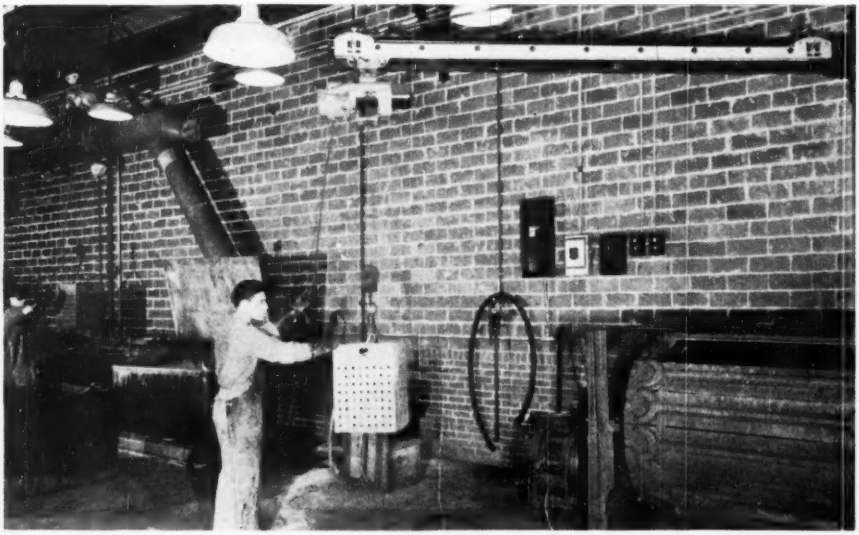
Polished bumper guards are cleaned and nickel plated, after which they are returned to the buffing room to be buffed on an Acme straight line setup similar to that used for polishing. Views of this conveyor are shown in Figs. 5 and 6. The guards are mounted on platens, coated with Buckingham liquid buffing composition and buffed by eight buffing wheels positioned at various angles to reach all significant surfaces. Ventilated-type buffs, driven at 2200 r.p.m., produce a high color on the parts rapidly and efficiently. When the return-type straight-line conveyor returns the buffed parts to the unloading position, they are removed and transported to the plating room for final chromium plating, packing, and shipping to the customer's plant.

Electric Hoist Equipment Speeds Finishing of Air Brake Hose Clamps

THE Union Switch & Signal Company utilizes two electric hoists to handle 40,000 air brake hose clamps per week through finishing operations at its new building in Swissvale, Pennsylvania. Railroads use the air brake hose clamps between both passenger and freight cars.

One hoist is trolley-mounted on a jib which swings to service a caustic tank and a tumbler. The other hoist is trolley-mounted on an overhead I-beam and services sulfuric acid, cold water, soda-ash, cold water, cyanide, zinc plating, hot water, and steam-drying equipment in that order.

As shown in the accompanying illustration, the clamps are moved from step to step in metal buckets. They are first dipped in the alkali cleaning tank and then several bucketsful are



Air brake hose clamps are handled through finishing operations in metal buckets with the aid of electric hoists.

BUCKINGHAM PRODUCTS

TRIPOLI

Labor-Cost is High— Get an Extra "Helper" FREE!

THERE IS A "HELPER" IN EACH BAR OF TRIPOLI LISTED BELOW—A helper for cleaning operations, a big time and labor saver.

These new compounds contain solubilizing agents to insure easy removal in weak alkaline cleaning solutions . . . Especially adapted for use on die cast parts. All surface blemishes removed with minimum effort . . . a high luster easily obtained.

Write for Samples of these Die Cast Grades

T-401

T-605

T-607

REPRESENTATION FROM COAST TO COAST

The BUCKINGHAM PRODUCTS Co.

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dumped into the tumbler and rotated at 40 or 50 r.p.m. for a period of 5 hours to carry off all scale from individual clamps. After being put back in the buckets, the jib-mounted hoist swings them to where they are picked up by the I-beam mounted hoist, and continued through processing.

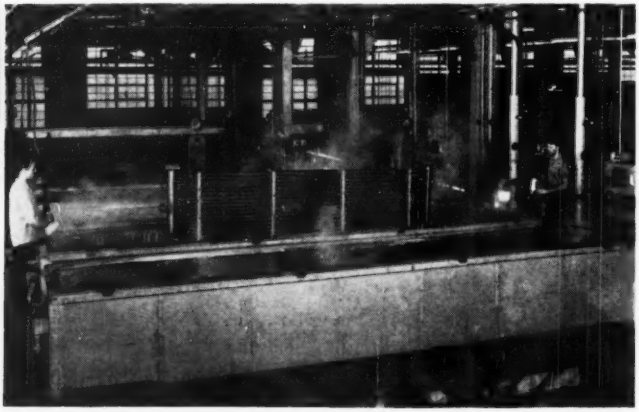
The hoists, products of the Philadelphia Division, Yale & Towne Manufacturing Company, eliminate all manual lifting operations and, since the hoists are electrically operated, all that is necessary to dip the buckets is to push a button. Both hoists have bulldog type conductor systems to carry current to the hoists.

Phosphatizing Treatment for Transformer Radiators

A NEW phosphatizing installation for treating transformer radiators has been installed at the Pittsburgh Works of the Allis Chalmers Mfg. Co. With the new equipment, fin-type radiators up to 18 feet in length may be given rust-proofing treatments. The installation is shown in the accompanying illustration, and, as may be seen, the movement of the radiators is regulated by two men who stand at the ends of the tanks and manipulate the controls for the handling equipment.

The radiators are Bonderized prior to a painting operation in order to inhibit corrosion and to increase the adhesion and durability of the paint finish. In the process, each radiator is submerged for a predetermined length of time in five successive tanks of cleaner, hot water rinse, Bonderizing solution, cold water rinse, and Parcolene rinse. With the exception of the solution in the fourth tank, all of the solutions are maintained at temperatures between 170 and 200 deg. F., depending on the operation. The tank solutions are checked every four hours in order to assure constant solution strengths.

Corrosion-Resisting Plug Valves. The Duriron Co., Inc., Dayton 1, Ohio, is offering Bulletin 636 describing the Type A corrosion-resisting plug valve, and Bulletins 637 and 638 describing Type B corrosion-resisting plug valves. Features of the valves are described by means of cutaway illustrations, and dimensions of various parts are listed in convenient tables.



The illustration shows two men manipulating a typical transformer radiator above one of the tanks in a five-tank Bonderizing system.
(Photo courtesy Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin)

SAVE ON WHEELS . . . STEP UP PRODUCTION

Speeds from 1,500 to 3,000 RPM are instantly available with the turn of the dial while the lathe is in operation. Polishing and buffing (cut-color-satin) can be done on one machine with no delays or lost motion.

The Hammond VRO Variable Speed Polishing Lathe definitely will step up production and improve finish. Maximum wheel economy is assured, too, because efficient peripheral speed can be maintained at all times — wheels can be used right down to the flanges before discarding.

Hammond

VRO

VARIABLE SPEED

POLISHING AND BUFFING LATHE

the DIAL does it

WRITE FOR CATALOG
Catalog showing all Hammond polishing lathes, abrasive belt, "OD" and automatic finishing machinery gladly sent on request. Write today!

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GOOD MACHINERY SINCE '82

Hammond Machinery Builders INC.

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Finishing Clinic

In this department are presented some of the questions submitted by readers together with suggested solutions of the problems outlined.

Question. *Do you have in your files information on the plating of plastics with gold, silver, and so on? G.A.T.*

Answer. A great deal of the work on plating of plastics has been done by Mr. Harold Narcus, technical director, Electrochemical Industries, Inc., Worcester, Massachusetts. The following information is quoted from his paper presented before the 32nd Annual Convention of the American Electroplaters' Society:

"Of the five methods of metallizing plastic, the more popular ones are the varnish-conducting powder method and the chemical reduction method. The varnish-conducting powder method simply involves the coating of the plastic with a varnish containing a conducting metal powder of some sort. After the varnish has dried thoroughly, the object may then be electroplated."

Mr. Narcus in this same paper outlines a typical process for plating a common plastic material such as cellulose acetate as follows:

"Let us assume that the parts are small plastic pieces which must economically be handled in bulk. These parts are first wet-tumbled using pumice and water or blasted with 220 grain aluminum oxide until the gloss is removed and a dull sandy finish appears on their surfaces. This operation (wet-tumbling) may take 1 to 5 hours, depending on the shape of the pieces. After thoroughly rinsing these pieces, they are cleaned in a cold caustic solution (dilute) for a short period. The parts are held in an ordinary acid-dip pot during this and the next operation. After thorough rinsing, the parts are treated with a stannous chloride-hydrochloric acid solution (which is patented)

or a ferrous sulfate, hydroquinone or pyrogallol solution for a short period and then thoroughly rinsed.

The parts are then placed in an inclined rubber bonding barrel which has enough water in it to cover the volume of the pieces. This barrel has ribs on its wall to ensure against mass rolling of the parts and it revolves about 4 r.p.m. The proper amount of ammoniacal silver solution is added and then the proper amount of the formaldehyde solution. The quantities used depend upon the square inch area of work. The bonding treatment requires about ½ hour —depending on the shape of the parts. It may be necessary to repeat the bonding operation. The freshly precipitated coating is capable of taking other coatings.

After a suitable silver coating is applied, as determined by testing with an ohmmeter or using a flashlight bulb connected in series with two test prods and a dry cell, the parts are rinsed thoroughly and allowed to dry. A hot air oven is recommended if overnight drying is not possible. When the parts are dry they are placed in an acid copper plating barrel rotating at about 6 r.p.m. Large pieces can be bonded in the same manner on wires or racks and plated in still tanks.

The amount of acid copper deposited usually varies from 0.001 to 0.01 inch in thickness, depending on the type of piece being plated. The thinner the deposit, the better the adhesion. After plating, the parts are usually bright dipped and tumbled, if in bulk, or polished in the case of large pieces. The final plate can be any desirable metal."

For further references on the subject of plating on plastics, you might care to consult one of the following:

H. Narcus, Trans. Electrochem. Soc., 88, Preprint 5 (1945)

U.S. Patent No. 2,010,805 (August 13, 1935)

U.S. Patent No. 2,063,034 (December 8, 1936)

U.S. Patent No. 2,303,871 (December 1, 1941)

U.S. Patent No. 2,325,528 (December 24, 1942)

U.S. Patent No. 2,355,933 (August 14, 1944)

Simond & Ellis. Handbook of Plastics, pp. 58-149 (1943)

—— fc ——

Question. *I am paint dipping steel and wood parts which are permitted to air dry. I should like to install a drying oven to bake finishes on both products but have found by testing that while a good finish is produced on the steel parts at 250 deg. F., the wood parts blister at the same temperature. Can you give me any information on this problem?* *J.G.*

Answer. As you have found out, you can bake paint on steel at 250 deg. F. (and for that matter, up to 500 deg. F.), but the same temperature will cause blistering of the same paint applied to wood.

When paint is applied to wood, the solvent is partially absorbed by the wood, and in the drying operation care must be used to prevent the solvent from being driven out of the wood so rapidly that it causes blisters in the finish. Most wood finishes must be baked at temperatures around 150 deg. F. Further, the finish should be brought up to this temperature very slowly over a period of 2½ to 3 minutes.

NEWS of the Industry

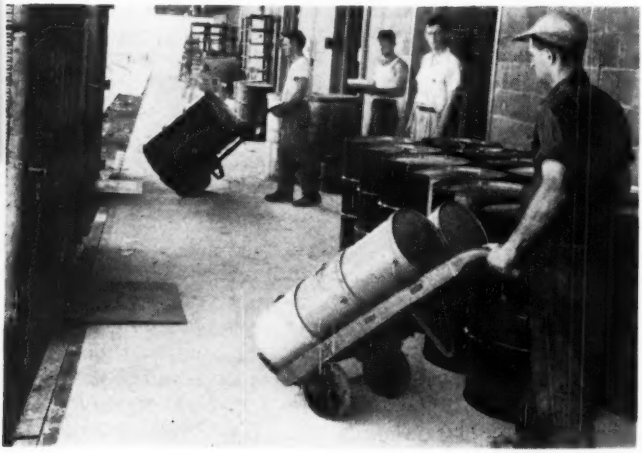
COMPANIES

Announcement has been made of the formation of the **RUSTPROOF SIGN AND METAL CO.**, 2408 Texas Ave., Houston 3, Tex., headed by Carroll A. Sanders, of Texas A & M, in association with Edward F. Dawley, formerly associated with Parkerizing, Incorporated of Texas.

The new firm will specialize in the fabrication, treatment, and finishing of traffic, highway, industrial and advertising metal signs, rust-proofed by processes patented by the American Chemical Paint Company of Ambler, Pennsylvania. In addition, the firm will offer consultation on corrosion problems as they are affected by phosphatizing, chromatizing, and chemical rust-proofing, followed by synthetic and plastic finishing.

According to an announcement by D. J. Richards, vice president in charge of sales, the Eastern Sales Division of **E. F. HOUGHTON & COMPANY** has been split into two sections: Eastern Sales North, which will include New England and New York State, and Eastern Sales South, including Pennyslvania, New Jersey, and Delaware. Orum R. Kerst will head the north section and J. R. Clendenning will take over the south.

A. C. Smith, former assistant to the eastern sales manager, has been promoted to the newly created post of sales coordinator for the two sections.



This scene records a milestone in the history of The Egyptian Lacquer Manufacturing Company. The picture shows the first shipment of finishing materials leaving Egyptian's new midwestern plant in Lafayette, Indiana, early this summer.

M. H. Corbin

"Finishes for Industrial Products" was the subject of a lecture given recently by M. H. Corbin, president of **STANDARD VARNISH WORKS**, New York, before a group of designers and engineers gathered for the Industrial Design Seminar at Lehigh University, Bethlehem, Pennsylvania.. Mr. Corbin was assisted in his presentation by Carl Bauer, industrial sales manager.

Mr. Corbin and Mr. Bauer centered their remarks and illustrative material about the importance of the selection of the proper type of finish for each individual industrial application. Use was made during the lecture of quantities of panels, each coated with a finish developed in the Standard Varnish Works laboratories for specific production projects.

On August 21 the Atlas Research Laboratories were dedicated at Mertztown, Pennsylvania, as a memorial to the late Maximillian F. Wirtz, who founded **THE ATLAS MINERAL PRODUCTS CO.**, in 1892. The ceremony was featured by the unveiling of a plaque in memory of the founder by his widow.

Fig. 1—Unveiling of the Maximillian F. Wirtz Memorial Plaque. Left to right, George L. Wirtz, Sr., son of the founder; Arthur F. Wirtz, Jr., and George L. Wirtz, Jr., grandsons of the founder; and Mrs. Bernardine Wirtz Dorr, widow of the founder.

The new laboratories are housed in a two-story brick building with over 5,000 square feet of floor space. A modern library and research administration office occupy part of the second floor. The laboratories are staffed by twelve chemists and technicians under the direction of Dr. Raymond B. Seymour, technical director, and Joseph Dahle, research director.

Fig. 2—Part of the staff of the Atlas Laboratories. Front row, left to right, George Gabriel, Joseph Dahle, director of research, James Fry. Second row, Carl DeLong, Willard Lantz, Walter Pascoe, William Rutter, Clifford Reinert, Richard Merkel, Carl Romig. Dr. Raymond B. Seymour, technical director, and Earl Erich were absent.

SOLVENTS RECOVERY SERVICE, INC., formerly at 1019 Broad St., Newark, N. J., has moved its main office to 101 Central Ave., Westfield, New Jersey.

Alfred W. Smart, who has represented Peters-Dalton, Inc., manufacturer of Hydro-Whirl paint finishing systems, and Allied Steel and Conveyors, Inc., both of Detroit, Michigan, announces the

formation of a new corporation, **FINISHING SYSTEMS, INC.** This corporation will continue to represent both companies exclusively throughout the East and will also add such items as spray finishing and quality control equipment, paint circulating systems, and other associated items to complete a full line of equipment for the organic finishing room.

Finishing Systems, Inc. will soon start construction of a building in Mineola, New York, which will include a testing laboratory.

To provide customers with the kind and degree of cleaning desired at lowest possible cost, the **DETREX CORP.**, Detroit 32, Mich., has established a consulting arrangement whereby industrial product engineering, estimating, quotations, orders, and customer field service are combined in the Equipment Division under the direction of T. J. Kearney, chief engineer. This setup provides for direct exchange of information with the research and development department, and makes complete and latest cleaning data immediately available for application to all field problems.

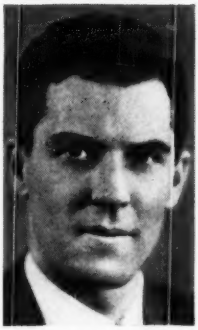
Mr. Kearney, who reports to W. F. Newbery, director of sales, has appointed S. G. Lakatos in charge of quotations and orders, and H. S. Tweedy to head the active field service.

Ralph R. Jenkins

A-ZED, INC., 80 E. Jackson Blvd., Chicago 4, Ill., jointly owned by Poor & Company, Chicago, and the Acme Steel Co., Riverdale, Ill., has recently been formed to engage in the research, manufacture, and sale of products and processes for all phases of the application and secondary treatment of zinc surfaces. The company will serve zinc electroplaters, hot dip galvanizers, and zinc base die cast manufacturers and finishers.

Officers of the new corporation are: president, F. A. Poor; vice-presidents, C. S. Traer, C. J. Sharp, and A. E. Chester; vice president and treasurer, P. W. Moore; secretary, P. W. Moore, Jr.; and general manager, Ralph R. Jenkins.

NEW POSITIONS



J. R. Williams

The Electric Products Co., Cleveland, Ohio, has appointed **J. R. WILLIAMS** as district manager of its Chicago, Illinois office. Formerly associated with the General Electric Company in Philadelphia, Mr. Williams is a graduate electrical engineer from the University of Illinois and has had a wide industrial background.

Also appointed were **HARRY J. FISHER ASSOCIATES**, with offices in Cleveland and Cuyahoga Falls, who will cover most of Ohio and the panhandle of West Virginia.

J. P. MOLIS, formerly district manager of the industrial maintenance department of the Diversey Corporation, has been named promotional manager of the newly formed maintenance department.

Mr. Molis joined Diversey 3½ years ago as a field service representative in the industrial maintenance department.

WILLIAM C. HOWARD, JR. and **WALTER E. FOREMAN** have been appointed field engineers by the Norton Co., Worcester 6, Mass., according to an announcement by Ralph M. Johnson, vice president in charge of sales.

Mr. Howard graduated from Worcester Polytechnic Institute in 1948 and recently completed his sales training course. He will report to Ronald W. Price, manager of District 2 (comprising the State of Connecticut) with headquaters in Hartford.

Mr. Foreman, until recently a member of the Norton Company sales engineering department at the Worcester plant, will report to Fred P. Hays, district manager in the Cleveland area.

New Combustion Safeguard

FACTORY MUTUAL
FM
APPROVED

BRISTOL ELECTRONIC PYROTROL

for gas-fired appliances

This new Bristol instrument (1) makes it impossible to light gas appliances under unsafe conditions and (2) shuts down the appliance promptly if an unsafe condition develops during operation.

A Combination of Features Found in No Other Combustion Safeguard

(1) *No special tubes needed.* You can get replacements in any radio store.

(2) *No special electrode cable needed.* For lengths up to 15 feet between electrode and Pyrotrol, use easily-obtainable BX flexible cable. Commercially available coaxial cable used for longer lengths.

(3) *You save on external wiring.* Power to operate main valve, pilot valve and ignition transformer supplied from Pyrotrol terminals.

(4) *Protects against unsafe start.* Safe-start relay prevents gas flow upon lighting off, should there be a leakage path in the electrode head or electrode cable of resistance value within normal flame operating range or a short circuit between electrode and ground.

(5) *Protects against tube failure.* Will shut down entire combustion system on loss of emission from any electron tube section.

(6) *No unnecessary shutdowns.* Prevents gas shut-off, in accordance with accepted insurance company standards, due to momentary flame flicker.

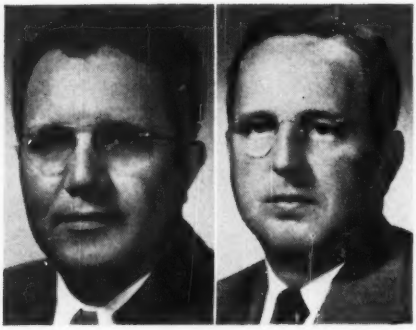
(7) *Unaffected by dust.* Completely dust-proof.

Write for Bulletin W1816. THE BRISTOL COMPANY, 108 Bristol Road, Waterbury 91, Conn. (The Bristol Co. of Canada, Ltd., Toronto, Ont.; Bristol's Instrument Co., Ltd., Lynch Lane, Weymouth, Dorset, England.)

60 YEARS...1889-1949
BRISTOL
Gives You the Most from Heat

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

C. D. Clawson, president of Ferro Enamel Corp., Cleveland, Ohio, has announced the promotions of **GLENN A. HUTT** and **GENE L. BRUTON**. Mr.



Glenn A. Hutt, Gene L. Bruton

Hutt, who has been general sales manager, will be assistant to the president, and Mr. Bruton moves from the position of assistant sales manager to sales manager.

A graduate of Ohio State University, Mr. Hutt joined Ferro in 1935. Mr. Bruton joined the company in 1936, and is a graduate of the University of Illinois.

Announcement of **D. E. WILLIARD'S** appointment as manager of industrial cleaning equipment and chemical sales for the central region of the U. S. for Detrex Corp., Detroit 32, Mich., has been made by W. F. Newbery, director of sales.

Mr. Williard has been with Detrex for over 15 years and has had wide experience in various sales, service, and production phases of the company's business. He is an expert on modern metal cleaning and finishing practices, and has been a key figure in the development of solvent vapor degreasing, as well as alkali and emulsion cleaning.

Appointment of **PHILIP HEIBERGER** as senior lacquer chemist of the Stamford, Connecticut branch has been announced by G. B. Work, general manager of the Atlas Powder Company, Industrial Finishes Department.

Mr. Heiberger was formerly with R. L. Evans Associates and a large eastern manufacturer of industrial finishes. He is a graduate of Brooklyn Polytechnic Institute and holds an M.A. degree in chemistry from Cornell University.

Appointment of **GEORGE V. WISE** as advertising manager of The H. B. Davis Co., Baltimore 30, Md., has been announced by H. Braith Davis, president.

Mr. Wise formerly was sales promotional manager and succeeds C. Carroll Cooper as advertising manager. In his new position he will be responsible for all phases of advertising for The H. B. Davis Company and its subsidiaries.

T. MAX STANGER has been appointed to the sales staff of the American Wheelabrator and Equipment Corp., Mishawaka, Ind., and he will have his headquarters at the newly established Salt Lake City office.

Before joining the company two years ago as a member of the service engineering staff, Mr. Stanger was associated with the American Foundry and Machine Company and with the Pacific Bell Telephone Company.

Wilfred S. McKeon, president of Sulphur Products Co., Inc., Greensburg, Pa., has announced that **LOUIS J. CAMILL** of Detroit has been appointed as a manufacturer's agent, representing Sulphur Products Company in the Detroit area.

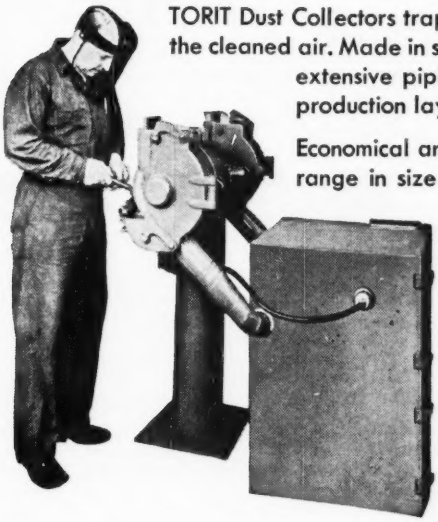
Mr. Camill has had considerable technical and practical experience in finishing, particularly in the field of zinc plating.

Louis J. Camill

B. D. BRUCE has been transferred from the research division to the service staff of the Chicago Vitreous Enamel Product Company, it has been announced.

Even non-explosive dusts are dangerous to health and working efficiency . . . Eliminate them with

TORIT DUST COLLECTORS



TORIT Dust Collectors trap dust at its source and recirculate the cleaned air. Made in self-contained units, they require no extensive piping and may be moved to fit new production layouts as needed.

Economical and efficient, TORIT Dust Collectors range in size from ⅓ HP to 3 HP. Models for all standard grinding, polishing and cut-off machines are available for quick delivery. For details and the latest Torit catalog, write:

TORIT
MANUFACTURING CO.
314 Walnut St. • St. Paul 2, Minn.

G. E. Dresser, C. W. Sprenger, L. P. Mercer

A graduate of the University of Illinois, Mr. Bruce has been associated with Chicago Vit since 1937.

GEORGE E. DRESSER, manager of Hardware-Automotive Sales for The Carborundum Co., Niagara Falls, N. Y., since 1920, has retired after 42 years' service on the company's sales force. Well-known in the hardware and automotive trades from coast to coast, he has served on important trade committees and has been interested in the activities of many of the organizations in these fields.

Succeeding Mr. Dresser is **CHARLES W. SPRENGER,** who was manager of Carborundum's New York office from March 1944 until he was appointed assistant manager of Hardware-Automotive Sales in July 1947.

L. P. MERCER, formerly manager of the Sales Training Department, has been selected as assistant manager.

L. Camel, sales manager of the Industrial Division of the Detrex Corp., Detroit 32, Mich., has announced the appointment of **W. H. WEBB** and **ALAN HARRIS,** specialists on alkali and emulsion cleaning.

W. H. Webb, who has had many years of experience with Detrex in analyzing specialized cleaning applications, has been placed in charge of the alkali and emulsion phases of sales, service, and consultation in Central United States.

Alan Harris, who has been concentrating his efforts on the field development work of Detrex cleaning compounds, will serve the metal industry in the Detroit area.

The appointment of **J. W. BRITTON** as head of the new Technical Service Division of Surface Chemicals, Inc., research and manufacturing chemists, has been announced by Charles Groff, technical director. He will work with industrial and commercial users in the application of new products being developed in the company's laboratories at McKees Rocks, Pennsylvania.

Maneely Chemical Co., Philadelphia, Pa., has announced the appointment of **MORGAN JONES** as superintendent of the Wheatland, Pennsylvania plant. Mr. Jones comes to the Maneely Chemical Company directly from the Calco Chemical Division of American Cyanamid Company at Marietta, Ohio, where he has been production superintendent since 1945.

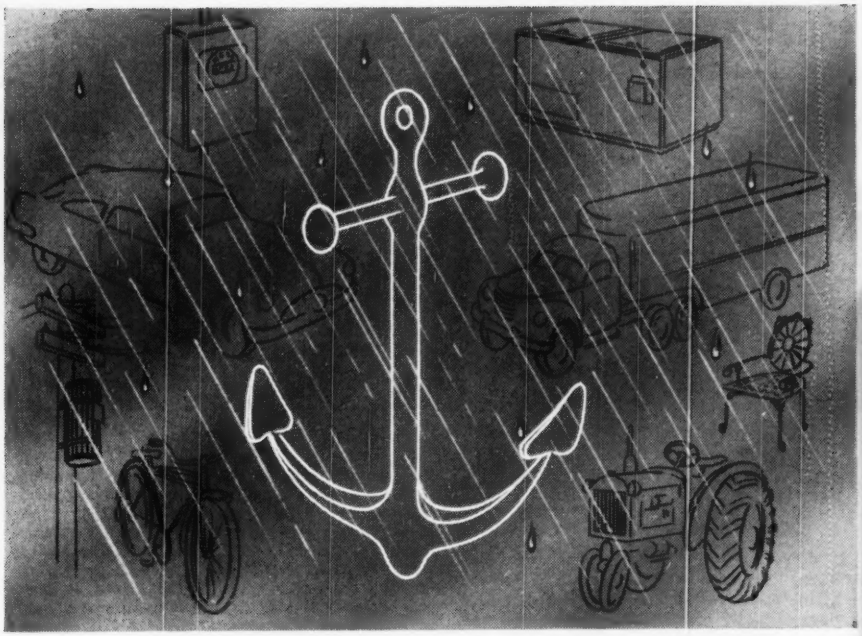
Turco Products, Inc., manufacturer of industrial cleaning compounds, have announced the appointment of **F. E. WARNES** as director of sales promotion.

Prior to this assignment, Warnes held the position of sales supervisor for the seven states of the Pacific Northwest.

SOCIETIES

From October 17 to 21 the **AMERICAN GAS ASSOCIATION** will sponsor a combined exhibit of industrial gas equipment at the National Metal Exposition, Public Auditorium, Cleveland, Ohio. The 12th Annual Industrial Gas Breakfast will be held Tuesday morning at the Hollenden Hotel. Speaker will be E. L. Shaner, Editor-in-Chief of "Steel."

Running concurrently with the Metal Show will be the A.G.A. Annual Convention in Chicago. The formal luncheon and session of the Industrial and Commercial Gas Section will be held on Wednesday, October 19.



BONDERITE...*an invisible anchor*

HOLDS PAINT TO METAL

After the paint's on, you can't see it. But the presence of that tight Bonderite layer under the paint means greater durability, longer life, and lasting good looks for the finish. Bonderite acts in these three ways to protect and preserve paint finishes:

1. It anchors the paint.
2. It resists rust and corrosion.
3. It prevents the spread of paint failure around scratches and accidental breaks in the paint.

Because of its proved effectiveness and the ease and economy of the treatment for metal surfaces, Bonderite is used on thousands of quality products.

To add quality to *your* product, use Bonderite, the invisible anchor for fine paint finishes. Full information at once on request.

Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Parker

PARKER RUST PROOF COMPANY
2172 East Milwaukee Ave.
Detroit 11, Michigan

BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant
PARCO LUBRITE—Wear Resistant for Friction Surfaces

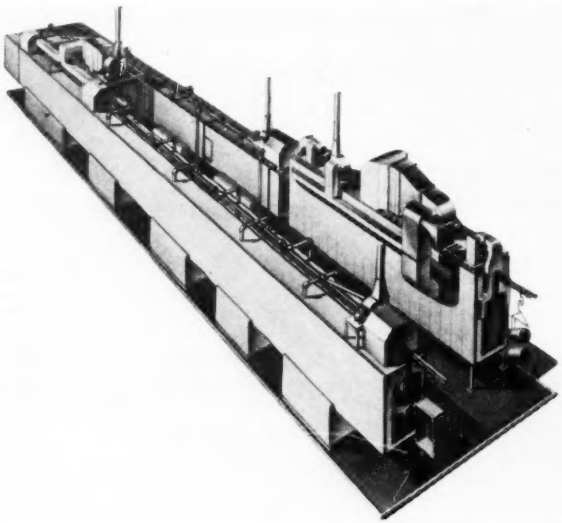
New • EQUIPMENT • MATERIALS • PROCESSES

Spray Washing and Pickling Machine

A completely enclosed washing and pickling machine which is said to reduce pickling time to less than one-third and to permit vast reductions in the volume of processing solutions has been announced by The R. C. Mahon Co., Detroit 11, Mich. The new Mahon Hydro-Hermetic Seal makes possible this advance in equipment for the preparation of metal surfaces for porcelain enameling. The process is continuous through all operations: emulsion cleaning, clear water rinse, alkali cleaning, three-stage water rinse, sulfuric acid bath, acid water rinse, nickel sulfate bath, sodium cyanide neutralizer, borax neutralizer rinse, and hot air dry-off.

Tanks and tunnel housing are of mild steel throughout except in areas where corrosive materials are in contact or fumes prevalent. In these areas, steel is lined with lead or rubber, or Monel metal is employed. The monorail conveyor, which operates in the open above the machine, is fitted with Monel adapters which are the load-carrying medium that passes through the Hydro-Hermetic Seal. Thus, no spray or fumes can escape or work up the adapters to damage the conveyor.

Advantages claimed for the the unit are: the



Spray Washing and Pickling Machine

top of the machine is sealed throughout its entire length, greatly increasing processing efficiency in each stage; loss of active chemical fumes is prevented; ventilating requirements are reduced to a minimum; and the necessity for a tremendous intake of air through an open conveyor slot is eliminated.

Unichrome Plastisols and Organosols

Rubber-like plastic materials, which are said to possess many chemical properties lacking in both natural and synthetic rubbers, have been developed recently by the Organic Coatings Division, United Chromium, Incorporated, 51 E. 42nd St., New York 17, N. Y. Known as Unichrome Plastisol and Organosol Compounds, their advantages include outstanding resistance to a wide variety of chemicals and corrosives; excellent resistance to mechanical abuse, such as abrasion; high dielectric strength; and easy handling.

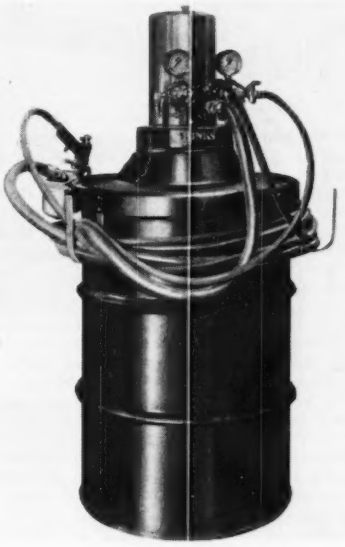
Unichrome Plastisols and Organosols are delivered in paste-like form and can be molded or applied as coatings to metal, fabric, or paper by dipping, spraying, or brushing. After baking at about 350 deg. F. for 20 to 30 minutes, the materials set and take on a rubber-like appearance. The cured compounds are said to resist acids, alkalies, salt solutions, oils, gasoline, greases, industrial oxidants, and a number of other types of chemicals and products normally corrosive to rubber. With just a single application they can be applied in thickness from 3/1000 to ¼ inch.

Binks No. UC 240 Underbody Coating Pump

Product of the Binks Manufacturing Co., 3118-40 Carroll Ave., Chicago 12, Ill., the Binks No. UC 240 is a lightweight air-driven pump which attaches quickly and easily to any standard 55-gallon drum. Dual material pistons provide surge-free delivery of material at a rate up to 5½ gallons per minute. The material is carried directly to the spray gun through a standard ¾-inch material hose.

The pump handles materials of light or heavy viscosity with equal ease, the manufacturer states, and makes possible faster spraying of thick underbody coatings. The material is delivered to the spray gun at four times the applied air pressure, assuring faster, more even flow. A standard two-regulator control permits precise regulation of both material and atomizing pressure.

Binks 7E1 spray gun, which is especially designed for the application of underbody and other heavy coatings, is



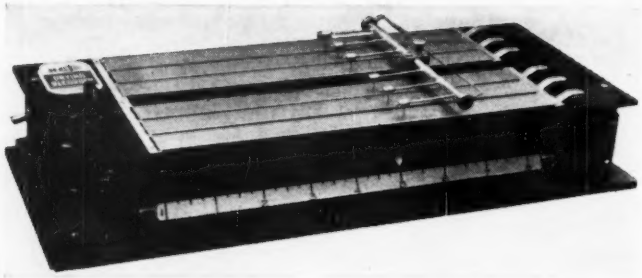
Binks No. UC 240 Underbody Coating Pump mounted on 55-gallon drum

recommended for use with this unit. The pump is available by itself or as a part of a complete outfit.

Drying Recorder

A device for precise measurement of drying time of any paint, varnish, lacquer, or enamel product has been introduced by Reichhold Chemicals, Inc., Detroit 20, Michigan.

The machine is small and compact (9¼ x 18½ x 3¼ inches) and may be used inside a cabinet to which auxiliary apparatus has been attached for the purpose of varying the temperature, humidity, light, and atmosphere under which drying takes place. Further, the instrument is said to be just as accurate when used in a vertical or inclined plane as it



Drying Recorder

is when used in a horizontal plane. This provides greater latitude in testing procedures.

To measure drying time on the device, a film of the surface coating material to be tested is applied to a steel testing strip $\frac{1}{32}$ x 1 x 12 inches which is placed on the table of the instrument. Six of these strips may be tested at one time. On each strip containing material to be tested a suitably spaced hemispheric needle is brought to bear by means of a movable carrier to which an indicator is attached. After the indicator is brought to the zero mark on the appropriate scale, an electric synchronous motor draws the carriage and the needles along the length of the strips, making tracks in the films being evaluated. Through the use of a 3-speed gearbox, the total travel of the needles can be made to occur in 8, 16, or 24 hours so that the drying times of quick-drying and slow-drying materials may be determined. Three scales are provided corresponding with the speed of travel of the needles upon which the length of track may be read in terms of time.

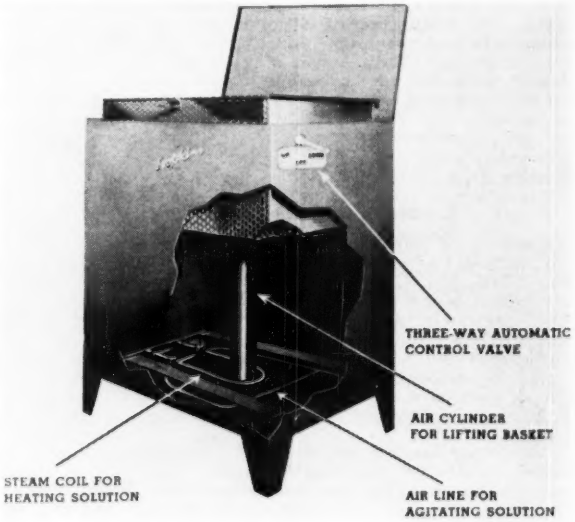
The drying recorder not only records different stages of the drying process corresponding to (a) thickening of film due to loss of solvent or oxidation, (b) gelation of the film or change from sol to gel structure, and (c) final hardening of the film; but also provides information on other properties of the film, such as adhesion, through drying, and tendency to wrinkle.

In addition to the data which may be read from the instrument, the strips upon which tracks have been made constitute a permanent record of the drying test.

Hopkins "Dip-O-Matic"

The "Dip-O-Matic," a completely automatic dip tank for fast and thorough cleaning of metal parts, has been marketed by the Hopkins Equipment Co., 66 Maple Ave., Hatfield, Pa. A three-way finger-tip control air valve automatically lowers and raises a specially designed basket into the solution, thus eliminating all manual labor in the operation.

Metal cleaning action is two-fold. Agitated solution action actively washes parts and releases stubborn dirt and grease that will not soak clean. There


THREE-WAY AUTOMATIC CONTROL VALVE
AIR CYLINDER FOR LIFTING BASKET
STEAM COIL FOR HEATING SOLUTION
AIR LINE FOR AGITATING SOLUTION

Hopkins "Dip-O-Matic"

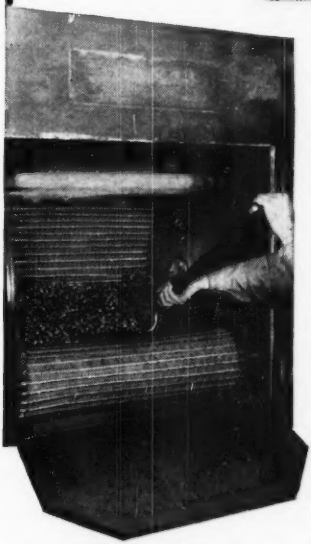
Cambridge WIRE BELTS

combine processing and movement with

SPEED

ECONOMY

DURABILITY



Speed, continuous production, and lower handling costs are the features of this Cambridge Roller Chain Belt for tumbling metal parts. Open mesh permits free drainage.

Whether your products are treated with heat, cold or corrosive agents, you can get a faster, more economical output by combining processing with product movement on a Cambridge woven wire conveyor belt.

SPEED—because the moving belt permits *continuous* treatment, ends time-wasting machine stops.

ECONOMY—because the belt reduces manual handling. In most cases one loader is adequate to feed the belt.

DURABILITY—because the wire belt for your particular installation is made from the specific metal or alloy to the mesh or weave best suited to your requirements.

Call in your Cambridge Field Engineer whenever you have a problem combining movement with processing.

FREE! 130 pages of illustrated data on Cambridge belts. Gives design, application, installation data. Write today on your letterhead.

There's a Cambridge Sales-Engineering Office near you!

Cambridge Wire Cloth Co.

Wire cloth in rolls.

Also specialized wire fabrications

Dept. A
Cambridge 10, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

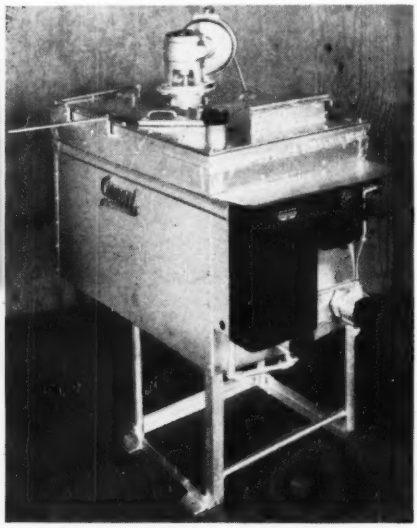
are no motors, pumps, or gears to wear out. Steam heat maintains the cleaning solvent at the proper temperature. Cold solutions may also be used. Automatic temperature controls are optional.

Aeroil Mixing Tank

Designed for melting and dispensing transformer, battery, and other filler compounds requiring mechanical agitation, an electrically-fired indirectly-heated tank has been introduced by the Aeroil Products Co., Inc., Wesley St., South Hackensack, New Jersey.

Constructed on the "double boiler" principle, the 25-gallon tank contains a series of heating tubes in the melting compartment to facilitate high speed uniform melting. The heat from four immersion type elements (two 4.5 kw. and two 3.5 kw.) is transmitted from the oil bath compartment to the melting compartment. The temperature of the oil may be controlled thermostatically at any point between 550 and 1000 deg. F. The dispensing valve is also heated by the hot circulating oil.

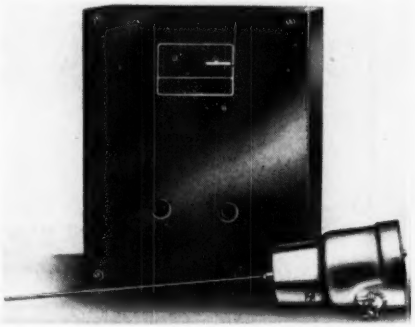
The unit is available completely insulated on all sides, bottom, and removable cover, and is fitted with mounting brackets which permit installation at any desirable working height.



Aeroil Mixing Tank

Bristol Electronic Pyrotrol

The Bristol Co., Waterbury 91, Conn., has developed its Electronic Pyrotrol which protects gas-fired furnaces, ovens,



Bristol Electronic Pyrotrol

kilns, boilers, dryers, kettles, and other similar industrial heating equipment from danger of gas explosions during ignition, operation, and shutoff.

According to the manufacturer, the Electronic Pyrotrol performs all of the operations of lighting a gas appliance that are recommended for absolute safety. If the normal operation fails at any step, the lighting cycle stops and closes any valve that has been opened. If, at any time the power supply should fail, the entire system is shut down in a safe manner. The safeguard shuts off all gas, lights signal, sounds alarm, and makes relighting impossible if any tube or relay in the instrument fails to function in its normal manner.

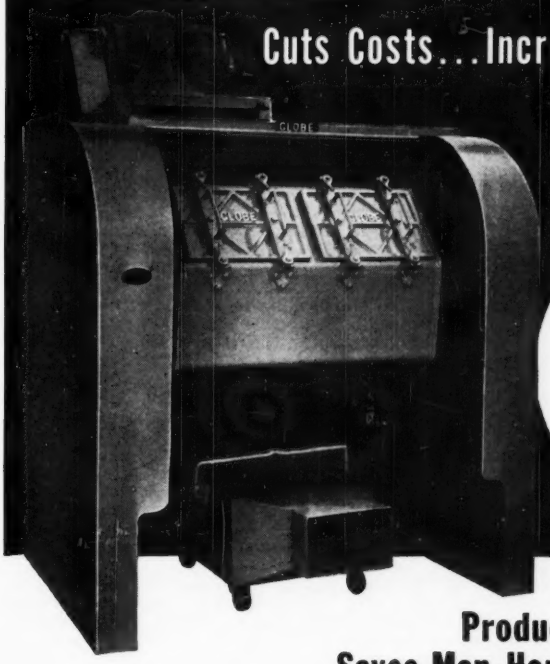
True Insulator

Offered by True Brite Chemical Products Co., P.O. Box 31S, Oakville, Conn., the True Insulator is especially designed to provide the maximum of protection to a plating tank from grounds and shorts, by insulating steam and water coils from power leaks outside the tank.

The True Insulator is built with rugged male-threaded fittings on each end of a hexagon-shaped coupling for easy and fast installation to any water or steam line. Genuine rayon braid steam hose, which is covered inside and out with rubber, provides insulation and long life with sufficient flexibility to permit at-

GLOBE *Burr-Rite* Senior

Cuts Costs...Increases Production!



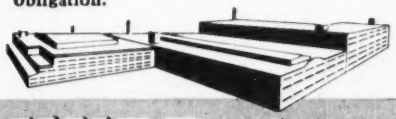
For Mass Production Precision De-Burring

Produces Finer Finishes! Saves Man-Hours of Hand Labor!

HUPP'S FREE
Experimental Service

Hupp's Experimental Engineering Laboratory will show you how to cut finishing costs. Send samples of parts to be processed along with finished part. There's no charge or obligation.

• Globe Burr-Rite Senior—the latest advancement in precision de-burring—finishes ferrous or non-ferrous parts and die-castings better and at lower cost. When desired, double or triple compartments permit de-burring and polishing at the same time. Larger, quick-opening aluminum doors and new hoist pan assure speedy loading and unloading. Write for specifications sheet.



Hupp Manufactures a Complete Line of Tumbling Barrels and De-Burring Machines

Dependable for 47 Years

HUPP CORPORATION

GLOBE STAMPING DIVISION

1250 WEST 76th STREET • CLEVELAND 2, OHIO

SERVING INDUSTRY SINCE 1902

tachment even on connections which are slightly out of line. The couplings have a permanent grip on the rubber which

True Insulator

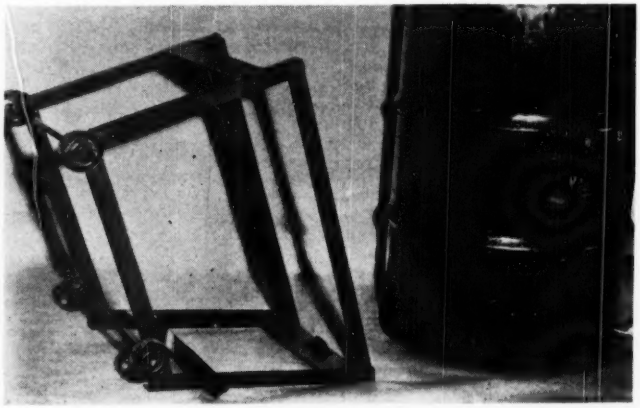
will not cut or bulge even when used with high pressure steam or with repeated cycles of steam and water, it is claimed.

The True Insulator has been pre-tested for use on any steam line with up to 40 lb. steam pressure or 125 lb. water pressure.

MorService Drum Cradle Truck

Incorporating fulcrum action at two points on a straight rocker, the new MorService Drum Cradle Truck, manufactured by Morse Mfg. Co., Inc., Syracuse 2, N. Y., enables one man to easily and safely handle drum loads up to 500 lb. The straight rocker feature enables operator to position nose of the truck close to bottom chime of drum where truck stands upright alone, permitting operator to roll the drum over safety catch located on the nosepiece. Drum and truck are then tilted as one unit to horizontal draining position with little effort and absolute safety aided by 2-point fulcrum action, it is claimed.

Equipped for portability with large 3-inch diameter wheels mounted on extra strong ½-inch diameter axles, the truck is constructed of high grade angle iron, electrically welded for maximum strength, and attractively finished in red, rust-resistant enamel. A tipping lever may be used with the truck for exceptionally heavy loads.



MorService Drum Cradle Truck in Position for Loading

Flame Failure Safeguards for Combination Gas-Oil Burners

Combustion Control Corp., 77 Broadway, Cambridge 42, Mass., has announced the availability of Fireye Flame Failure Safeguards and Programming Systems to facilitate the combination of gas-oil burners with complete safety and a minimum of electrical and mechanical adjustment when changing from the principal fuel to the stand-by fuel.

With heavy oil as the main fuel and gas as a stand-by, Fireye System FF-2 is used. This consists of Photoelectric Scanner Type 45PH5, Flame Rod Type 45JP1, and the Programming Control Type 24PJ8. When the system is used on heavy oil, the electronic rod monitors the gas pilot flame, thus preventing the main fuel valve from opening until flame is established. The photoelectric scanner monitors the main oil flame, turning off the entire system in case of flame failure. The programming control automatically starts the burner in operation and programs the sequence of oil valve delay, post-ignition timing, and priming period.

When the installation is converted to gas, the electronic rod monitors the continuous gas pilot flame and the programming control programs fuel and ignition systems. A simple switching means is all that is required for the change-over from oil to gas.

With gas as the main fuel and light oil as the stand-by, Electronic Rod Type 24JQ1 and Control Type 24QJ5 (Fireye System FF-6) are used. With either gas or oil as a fuel, the electronic rod monitors the continuous gas pilot, providing through the control instantaneous safety shutdown of the main flame on pilot

Problem

To cut costs on buffing Costume Jewelry.

Solution

USE

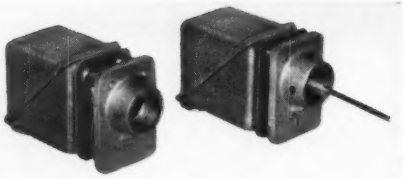
WILLIAMSVILLE BUFF DIVISION
EST 1893 A1 ®
DANIELSON CONNECTICUT

BUFFS

Result

Perfect finish with 86/93 count specially treated loose buffs.

WILLIAMSVILLE BUFF DIVISION
The Bullard Clark Company
DANIELSON, CONNECTICUT



Flame Failure Safeguards for Combination Gas-Oil Burners

flame failure. Monitoring operations on gas and light oil are identical and no wiring changes are required on change-over.

Alkalinity Test Paper Set

A compact kit consisting of three vials of selected indicator papers which will quickly show whether the alkalinity of a solution is due to caustic, carbonate, or bicarbonate has been developed by the LaMotte Chemical Products Co., Towson, Md. The set is recommended for use in chemical manufacturing, power plants, process industries, and any place where it is necessary to control the alkalinity of treated water.

Antaron Compounds

Five anionic foaming detergents, known as the Antarons, have been added to the list of Antara Products, General Aniline & Film Corp., 444 Madison Ave., New York, N. Y., manufacturer of detergents, wetting, and dispersing agents.

The anionics are alkyl amide sulfonates and are companion products to Antara's non-ionic Antarox series, the aromatic and aliphatic polyglycol esters and ethers. Like the Antaroxes, the Antarons are designated by number, each having different characteristics and properties.

Antaron N-185 is a product which comes as a buff-white powder with a slightly sweet odor. This product is soluble in water, hard water, and moderately soluble in electrolyte solutions. It is also stable in acid solutions, alkaline solutions, metal ions, boiling water, and on storage. The greatest application for Antaron N-185 is in the prevention of curd formation of 2.4-D amine salts in hard water. It may also be used in metal cleaning such as a steel pickling bath assistant, foamer, and dispersant for metal salt precipitates, and in neutral or alkaline metal degreasing.

Antaron L-114 is a light yellow gel, and is stable in acids, alkali, hard water, metal ions, boiling water and on storage. It is also soluble in water and hard water and is moderately soluble in electrolyte solutions and ethanol. Antaron L-114 may be used in most of the places that Antaron N-185 is used, except in the dispersing of 2.4-D amine salts in hard water.

Antaron R-275 comes as grey-white powder, and is stable in hard water, metal ions, boiling water, and on storage. It is also soluble in water, hard water, and electrolyte solutions. It may be used in metal cleaning with Antarox A-180 for non-alkaline metal degreasing.

Interchemical Rotational Viscometer

Completely redesigned, with all operating parts within one housing, the Interchemical Rotational Viscometer is now being offered by the Precision Scientific Co., 3737 W. Cortland St., Chicago 47, Ill. The housing table top contains controls and dials within easy reach of the operator, thus making the apparatus simpler to manipulate.

The viscometer has a broad utility and will provide complete data on the flow properties of greases, paints, printing

Interchemical Rotational Viscometer

START with a K-P Belt for a FAST FINISH

Korb-Pettit Spiral Woven Wire Conveyor Belts are fabricated in suitable metals and mesh sizes for baking, conditioning, heat treating, material-handling, processing and washing. Particularly well adapted to conditions where drainage and the free circulation of air are required. K-P Flextrough Belts with flanged edges prevent the escape of small parts. Side chains can be provided for sprocket drive.

K-P Spiral Woven Wire Conveyor Belts increase production and sting the maintenance bill at the same time because they are backed by superior engineering skill and the accumulated experience of many years.

Consult with the K-P district sales office or write direct. Korb-Pettit Wire Fabrics and Iron Works Inc., 1509 North Mascher Street, Philadelphia 22, Pa.

•

Korb-Pettit Spiral Woven Wire Conveyor Belts

"Keeps Promises"

Wire mesh, Spiral Woven Wire Conveyor Belts, Infra-Red Conveyor Dryers, Leather Finishing and Drying Machines, Complete Special Purpose Conveyors designed and Manufactured to Order.

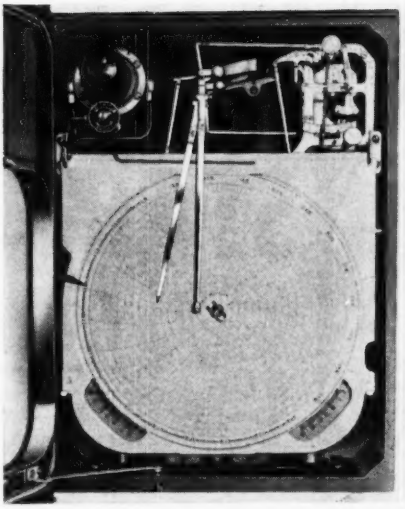
inks, plastics, adhesives, and many other similar industrial products, the company states. It produces consistency curves in place of single point measurements.

The Interchemical Rotational Viscometer consists essentially of a rotating sample cup and a stationary bob immersed in it. When the cup is rotated, the viscous drag on the bob is imposed on a coiled spring which is twisted through an angle measured on a calibrated disk. The speed of cup rotation can be varied from 10 to 400 r.p.m. in steps of 10 r.p.m. with the G-E Thy-Mo-Trol drive.

Bristol Series 500 Controller

Equipped with calibrated control actions, a controller for automatically controlling temperature, pressure, flow, liquid level, humidity, and pH value has been announced by The Bristol Co., 108 Bristol Rd., Waterbury 91, Conn. Reset rate, derivative time, and proportional band adjustments are accurately calirated and reproducible.

According to the manufacturer, the controller has only one service adjustment. It can be completely disassembled, and after being reassembled with replacement parts, only one adjustment is required to put the system in exact calibration.



Bristol Series 500 Controller

Readily convertible from one type to another, the controller is available in five types of control action: on-off, proportional, reset, derivative, and reset plus derivative.

H-511 Ubabond

H-511 Ubabond, a synthetic rubber cement developed by the Union Bay State Chemical Co., 50 Harvard St., Cambridge, Mass., allows for the pre-cementing of many surfaces, such as leather, fabrics, glass, steel, and so on, which can be joined together at a later time, on an assembly line, or even after shipping to the point of use without loss of adhesion efficiency.

Upon application, H-511 Ubabond dries to a non-tacky condition after a period of from 15 to 30 minutes at room temperature. When the pre-heated surfaces are to be joined together, reactivation can be accomplished easily and quickly by heating the "dead" surfaces under infra-red, steam or dry heat, or by brushing or spraying a solvent on the pre-cemented surfaces.

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DEBURRING WILL CUT GRINDING COSTS
Motor Driven Tilting Tumbling Barrels for cleaning, polishing, grinding, deburring, sanding, burnishing and various other applications.
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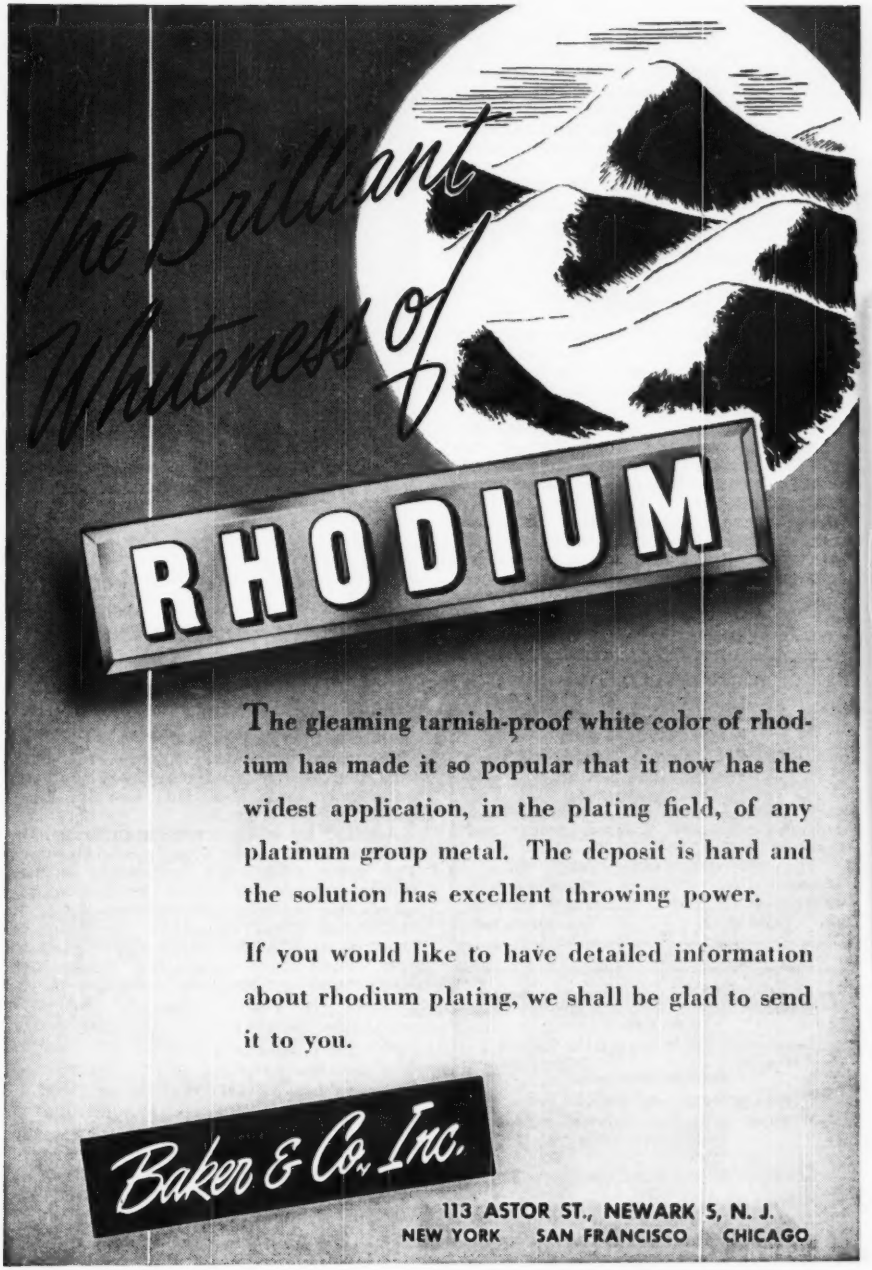
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The gleaming tarnish-proof white color of rhodium has made it so popular that it now has the widest application, in the plating field, of any platinum group metal. The deposit is hard and the solution has excellent throwing power.
If you would like to have detailed information about rhodium plating, we shall be glad to send it to you.
Baker & Co., Inc.
113 ASTOR ST., NEWARK 5, N. J.
NEW YORK SAN FRANCISCO CHICAGO

Nu-Syntol

Product of the Hilo Varnish Corp., 42-60 Stewart Ave., Brooklyn 6, N. Y., Nu-Syntol is a gloss white synthetic enamel which is said to resist the action of alkalies, grease, cosmetics, liquor, juices, gasoline, and machine oil. It requires only a 10-minute bake at 250 deg. F. to provide a smooth, full high-gloss white surface.

"Surprep"

For cleaning aluminum, steel, and zinc surfaces prior to organic finishing, Enthone, Inc., 442 Elm St., Dept. PF, New Haven, Conn., has developed "Surprep." This product is a liquid that contains oil-displacing chemicals which quickly dislodge oil, grease, and other organic material from the surface of metals so that they can be quickly rinsed off with water or wiped off with a cloth. The material also contains phosphating and other rust-removal chemicals for quickly dissolving rust, oxide, and scale while the oil removal agents are operating.

Used either full strength or diluted with water, Surprep is applied by brushing or wiping with a cloth. After several minutes, the surface can be wiped off with a cloth and it is then ready for painting. The surface can also be hosed off with water and then wiped dry.

Illustration shows the quick action of "Surprep" in removing oil and solid dirt from steel.

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GOLD PLATING SOLUTIONS
In All Colors
Guaranteed 100% Pure Gold Content
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Proven Quality by the Acid Test
Write or call our experts about your plating problems

Davis-K-Products Co.
54 West 22nd St., New York 10, N. Y.
Oregon 5-0094
5-0095

"Mask"

"Mask," a scientifically compounded shielding or masking liquid for use in masking off paint and trim jobs, has been announced by M-M-A, Inc., Box 411, Lancaster, Pennsylvania.

Applied by either spray gun or brush, Mask adheres to the area to be protected. The more liberal the application is, the easier it peels off when the job is finished, the manufacturer states. After it has dried (20-25 minutes), the paint is brushed or sprayed on and permitted to dry. Then the separating edges are scored and the coating of Mask is removed.

Nalco Metal

Nalco Metal, product of the National Lead Co., 111 Broadway, New York 6, N. Y., is a new lead alloy for use in chromium plating which is said to provide longer service than the alloys it has replaced in many installations, both in industrial and decorative plating.

Nalco Metal is used for tank linings,

anodes, and heating and cooling coils, and is claimed to be very resistant to the corrosive and pitting action of chromic acid solutions. In sheet form it is easily cut, trimmed, and shaped to the contours of the tanks. In pipe form Nalco Metal is readily coiled or looped and bound, clipped or blocked into units of any desired design or form.

"Mironizing"

Marketed by the Technical Processes Division, Colonial Alloys Co., Philadelphia 29, Pa., "Mironizing" is a dip process employed to mirror-brighten and protect aluminum and its alloys, which is performed in a few minutes by means of simple immersions in aqueous solutions. These treatments either in the as-brightened or as-protected condition are designed to produce excellent bases for paints and lacquers, and often, as-fabricated parts can be put through this finishing sequence without prior polishing or buffing, the manufacturer states.

Part of this process will produce passivated mirror-type finishes alone, which, if followed by anodizing and coloring, produces brilliant colored effects simulating most any of the brightly polished metals, such as gold, silver, copper, brass, chromium and so on, or other colors. The corrosion resistance is much greater than the best plated metals, and no after-lacquer is required, it is claimed.

Tygon Series "K" Paint Coating

A self-priming vinyl base paint that adheres tightly to metal, wood, or concrete, Tygon Series "K" Paint Coating is now available from the U. S. Stoneware Co., Akron, Ohio. For normal conditions two to three coats are said to provide effective and long-lasting protection. It may be brushed or sprayed; it air-dries quickly or may be baked.

According to the manufacturer, Tygon Series "K" shows excellent resistance to the corrosive fumes of almost all acids and alkalies, as well as to excessive humidity, grease, oil, and alcohols. It is softened by aromatic hydrocarbons, ketones, and esters. It is non-oxidizing, non-inflammable when dry, and possesses a temperature limit of approximately 200 deg. Fahrenheit.

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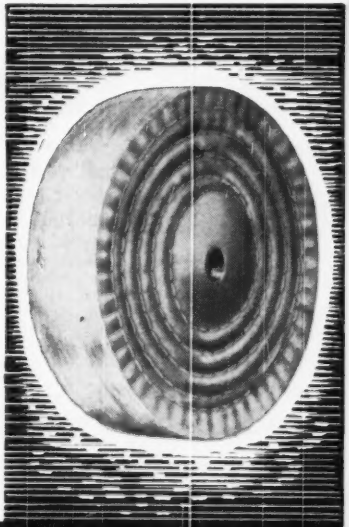
MANUFACTURED FOR 31 YEARS



MADE TO FIT YOUR PARTICULAR BUFFING PROCEDURE

Personal attention to each order and rigid adherence to your specifications, make for greater buffing efficiency. Schotco pieced buffs are made from the finest material available. Sewn by expert buff makers to give lasting usage and greater durability. Write or wire for samples and prices. Our large production capacity will assure you of prompt service.

THE SCHOTT BROS. CO., INC.
WEST SALEM, OHIO, U. S. A.

Oakite Compound No. 33

An acid type cleaning and surface conditioning material, Oakite No. 33, marketed by Oakite Products, Inc., 120 Thames St., New York 6, N. Y., is designed to remove rust, oxides, grease, oils, and shop soil from metal surfaces and to prepare ferrous metals and aluminum for sure-grip adhesion of paint, lacquer, and enamel finishes.

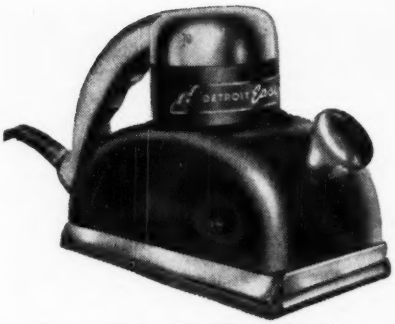
According to the manufacturer, Oakite Compound No. 33 possesses excellent detergent and solvent properties, and may be used for prepaint cleaning of large steel or aluminum parts or sheets by the wipe-on method.

For washing medium-size or small parts, Oakite Compound No. 33 solutions may be employed in tanks or in acid-resistant washing machines at working temperatures approximating 140 deg. F. Water rinsing and quick drying complete the cleaning-conditioning cycle.

Portable Electric Sander

Smooth, vibrationless operation is the outstanding feature claimed for a portable electric sander, designated as the Detroit Model DF "Easy" Finisher, announced by the Detroit Surfacing Machine Co., 7433 W. Davison, Detroit 4, Michigan.

Designed to provide for straight-line sanding, rubbing, and polishing so as to eliminate marring or scratching of work surfaces, the tool includes a streamlined rear handle which allows for comfortable one-hand operation. An instantly attached front guide handle is furnished with the sander for use on overhead work and other jobs where two-hand operation is more comfortable. An easy-to-use abrasive paper holder permits the attachment of several sheets at one loading.



Detroit Model DF "Easy" Finisher

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Infra-Red Lamps in Your Drying Units

Time tested — job tried. Nalco Infra-red lamps have proven highly efficient and long-lasting for all types of drying, baking or heating installations . . . self reflecting or clear glass type.

Send for "Drying Problems Made Easy"

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K-105 Safety Lacquer Thinner

The Elston-Nichols Co., 7 W. Madison St., Chicago 2, Ill., has marketed its K-105 Safety Lacquer Thinner which has been approved by the Underwriters' Laboratories, meets the municipal code requirements of most cities for full drum storage, and greatly reduces fire insurance rates.

Said to be a slow-drying product to eliminate "blushing," K-105 is water-white so that it will not discolor clear lacquers, has a mild odor, and provides for flat flow-out.

Bete Spray Nozzle

Possessing a spiral design that produces a fine atomization, yet practically non-clogging, the Bete Spray Nozzle has been introduced by Channing L. Bete Co.,

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* **4316 Paul St., Phila., Pa.**

Bete Spray Nozzle

Inc., 20 Federal St., Greenfield, Mass. The nozzle shears from a single high velocity jet a continuous film which readily breaks up into uniformly fine particles.

The Bete Spray Nozzle is produced in various spray patterns and with flow rates from ¼ to 100 gallons per minute. It is designed for use where a fine breakup at low pressures is required.

Zapon 401-191 Lacquer Enamels

Introduction of its line of gloss lacquer enamels for manufacturers of toys, chain store household items, and novelties has been announced by the Industrial Finishes Dept., Atlas Powder Co., Stamford, Conn., and North Chicago, Ill. Known as Zapon 401-191, the enamels may be used on pretreated or primed metal, as well as wood.

Available in all colors and formulated for either spray or dip application, the lacquer enamels are claimed to possess unusually good adhesion to wood, and will air-dry with normal lacquer speed, producing a tough, durable finish.

Filtering System

High operating efficiency with a minimum of maintenance attention is the principal feature of a new filtering system designed by the Commonwealth Engineering Company, applied research and development engineering organization of Dayton, Ohio.

The design provides a unit which acts as an automatic, self-renewing filtering system adaptable to permanent installation in electroplating and other processing setups to completely remove solid impurities in continuous or intermittent operation as desired.

The completely automatic system works efficiently with all types of solutions; even difficult slimes such as those from cyanide plating tanks, and those composed of iron and aluminum hydroxides have been successfully filtered.

The central idea of the development is the passage of the solution through a layer of filter which is removed as rapidly as it becomes clogged with impurities, and immediately replaced with fresh material.

As developed in the laboratory apparatus, a revolving drum—with perforated cylindrical surface—is coated with a filter aid of a diatomaceous or comparable type. The drum is submerged in the filter tank which is directly connected by piping to the plating tank. The solution passes through to the interior of the drum under the influence of suction supplied by a pump, and impurities are trapped in the filter cake. Clear filtrate returns to the plating tank.

To accomplish the self-cleaning function, the drum revolves against a blade set at the top to remove the spent filter layer, which is transported up a ramp and dropped to a disposal container.

Immediately back of the blade is the slurry chamber in which filter aid is received from a hopper above and diluted with fresh solution from the plating tank. The aid deposits itself on the drum in the small segment exposed to the chamber to replace the spent layer as the latter is removed.

An electrical control system applied to the apparatus regulates the intermittent

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ZINC

SOLUTION

Sulphur Products Co.

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Sole Producers of

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rotation of the drum and slurry mixture to meet the requirements of the filtering operation.

Unusually high flow rates have been achieved in the new design, which has been brought to the point of application to production scale equipment. Using aqueous solutions, the pilot apparatus in sustained operation has reached a flow of five gallons per minute per square foot of filter.

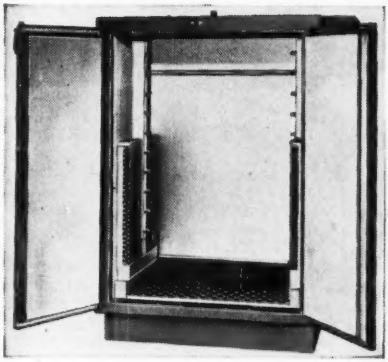
EHW Formula

Available from the Temperature Equipment Corp., 4504 Euclid Ave., Cleveland 3, Ohio, EHW Formula is said to provide a protective coating for all metals and plated surfaces against rust, corrosion, pitting, and tarnish.

A tough, transparent, and colorless coating that will withstand weather, heat, cold, grease, grit, and so on, and removable with standard acetates, EHW Formula can be applied by brushing, spraying, or dipping. It dries in 2 minutes and can be handled in 5 minutes.

Belke Electric Oven

Accurately controlled temperatures for effective curing of plating rack coatings can be maintained through use of the Belke Electric Oven, according to the manufacturer, Belke Manufacturing Co., 947 N. Cicero Ave., Chicago 51, Ill. Developed especially to provide the necessary preheating and curing facilities for coating plating racks with Belke Universal Plastic and other coatings, the oven is said to also provide controlled heating facilities for many other uses in various types of plants and laboratories.



Belke Electric Oven

Ruggedly constructed of sheet steel and angle iron throughout, the Belke Electric Oven is completely wired and ready to hook up for most electrical service requirements. It is available in three standard sizes or made to specification.

Pennsalt Cleaner AC-19

The Whitemarsh Research Laboratories of The Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., have announced a powdered acid-type cleaner developed primarily for cleaning exteriors of painted railroad passenger coaches, Diesel and electric locomotives.

Known as Pennsalt Cleaner AC-19, it is claimed to have exceptionally good rust and stain removing properties and detergent action, yet does not attack, mar, or soften paint. It is completely soluble in cold water and rinses freely from cleaned surfaces. It leaves no objectionable streaks and does not promote corrosion, the manufacturer states.

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Fast, scientific method for measuring resistance to surface abrasion - eliminates time-consuming, expensive service tests. Used by hundreds of industrial and educational laboratories. Write for literature.
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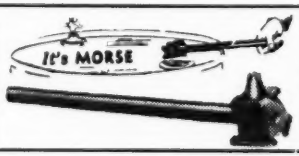
Instantly loosens, tightens 95% all plugs or bungs in steel drums. Has 16" extra-strong steel tubing handle. Wgt. only 2 lbs. Order 1 or more today!



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SATISFACTION GUARANTEED... $2.60
Non-sparking type $4.00
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124 Dickerson, Syracuse 2, N.Y.

"Boothcote"

Hygrade Food Products Corp., Harris Soap Div., 18 Stetson St., Buffalo 6. N. Y., has available a spray booth coating called "Boothcote," which is said to cut booth cleaning time and eliminate a production "bottle-neck."

Boothcote is sprayed on the walls of spray booths before painting operations are begun. When enough paint overspray has encrusted on the walls of the booths, the whole accumulation can then be stripped off in large sheets. No scraping is necessary.

Requiring only 3 or 4 minutes to apply and strip off, Boothcote is said to be non-inflammable, non-toxic, and harmless to the skin, and is applicable for use in connection with all types of finishes, such as varnish, shellac, lacquer, enamel, stain, and so on.

PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

Bristol Series 500 Air-Operated Controllers for automatically controlling temperature, pressure, flow, liquid level, humidity, and pH value are completely described in a 32-page illustrated bulletin, No. A120, obtainable from The Bristol Co., 108 Bristol Rd., Waterbury 91, Connecticut.

Hercules Synthetic Resins. A revised edition, this 20-page technical booklet describes the properties and uses of the synthetic resins now available from Hercules Powder Co., Inc., Wilmington, Del. A key to specific uses for the resins is provided by a chart which matches the resins with their actual and potential uses. From this index the formulator can pick out the resins indicated for use in a particular field. Then, by turning to the descriptions of the resins, he can study the properties of the desirable resins only and thus quickly select the resin best adapted to his needs.

Contour Belt Polishing, its methods of application and its advantages are discussed in a four-page mailing piece prepared by Behr-Manning, Troy, New York.

Ceilcote Fume Duct Linings for plating, pickling, and chemical fume removal systems are the subject of a technical data sheet prepared by The Ceilcote Co., Rockefeller Bldg., Cleveland 13, Ohio. Properties of the linings, application instructions, and other data are included.

Diamond Standard Silicates, a 20-page pocket-size manual which reviews its silicate of soda products, has been issued by the Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio. Designed for quick reference, the booklet concisely describes 10 standard grades of Diamond liquid silicates of soda commercially available. Data presented on each grade summarize its principal physical properties, major industrial applications, and basic advantages provided.

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PALLADIUM PLATING SOLUTION

A white non-tarnishing finish similar to platinum and rhodium plating, but costing one-fifth as much. Used extensively in electronics to protect silver and other metals from tarnishing, in the optical industry, jewelry, etc.

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Gold, silver, platinum and palladium anodes

Acme Semi-Automatic Polishing and Buffing Machines are the topic of a 20-page two-color bulletin issued by the Acme Manufacturing Co., 1645 Howard St., Detroit 16, Mich. The catalog includes descriptions and illustrations of the machines, together with line drawings and complete specifications.

Rectifier Bulletin 248. Model EPF 4304 Selenium Electroplating Rectifier, produced by The Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio, is illustrated and described in a bulletin available from the company. Electrical and mechanical characteristics of the rectifier and construction and operation features are described.

Bristol Bulletin No. W1816. The Bristol Co., Waterbury 91, Conn., has prepared Bulletin No. W1816 which describes the Bristol Electronic Pyrotrol and its application in protecting gas-fired ovens, furnaces, kilns, boilers, dryers, kettles, and other similar industrial heating equipment from the danger of gas explosions during ignition, operation, and shutoff.

"Solvent Recovery by the Columbia Activated Carbon System" is the title of a 36-page, well-illustrated booklet published by the Carbide and Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. It supplies general information regarding the "Columbia" system of solvent recovery and indicates where it may be profitably employed. Data regarding other applications of the company's activated carbon are also included.

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All paint restored to original consistency without opening the can.
2 minutes per gallon.
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Pamphlet on Fume Washers. The Maurice A. Knight Company, Akron, Ohio, has issued a four-page pamphlet on fume washers for corrosive fume service. This equipment is used to absorb HCl fumes, to suppress oil and acid mists, to remove dust from exhaust gases, to remove chlorine fumes, and to cool hot acid gases for processing and other similar operations.

Ucilon Protective Coatings. A four-page bulletin issued by United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y., presents information on four groups of coatings expressly developed for corrosion control, chemical resistance, and heavy duty industrial painting. Essential facts on various formulations are briefly outlined, and case histories cited.

Transmission Belting Catalog. A new 28-page catalog giving detailed design, engineering, and performance data for its line of transmission belting has been published by the mechanical goods division, United States Rubber Company, New York 20, N. Y.

Tables on belt speeds, arc of contact, friction, horsepower correction, and service factors are included in the manual, together with hints on the proper selection of a belt and the procedure for analyzing belt drives.

Bulletin 804, available from Belke Mfg. Co., 947 N. Cicero Ave., Chicago 51, Ill., gives complete information on how Belke Corrugated Lead Anodes increase chrome plating efficiency. The bulletin describes the larger anode surface area made possible by the corrugated design, and the V-shaped, knife edge Belke Anode Hooks that assure positive two-point contact with bus bar.

"Consulting Services" is the title of the 132-page twelfth edition of its Classified Directory issued by the Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st St., New York 17, N. Y. Included are an alphabetical and geographical index of consultants, key sheet for easy reference, scope pages describing each member's qualifications, and other useful information.

Products Data Sheet, prepared by Pioneer Steel Ball Incorporated, 37 Mill St., Unionville, Conn., contains technical data and statistical tables which answer the questions most frequently asked about steel balls for bearings, stainless steel balls, bronze balls, burnishing balls, and materials for tumbling barrel applications.

Belke Electric Oven for curing coatings on plating racks is illustrated and thoroughly described in Bulletin 1061 which can be obtained from the Belke Manufacturing Co., 947 N. Cicero Ave., Chicago 51, Illinois.

EHW Formula, a protective metal coating that protects all metal surfaces, is the subject of a leaflet prepared by the Temperature Equipment Corp., 4505 Euclid Ave., Cleveland 3, Ohio. Descriptive data, application instructions, and a report from an impartial testing laboratory are included.

Randall Engineered Equipment, which includes degreasers, tanks, lathes, dryers, fully automatic washing machines, and agitators, is illustrated and described briefly in a four-page two-color bulletin prepared by the Randall Manufacturing Co., Inc., 801 Edgewater Rd., New York 59, New York.

American Wheelabrator & Equipment Corp., 509 S. Byrkit St., Mishawaka 5, Ind., is distributing a leaflet descriptive of **"Tru-Steel Shot,"** a genuine true steel that has received a full heat treatment, for blast cleaning.

Roto-Wash Spray Booth Bulletin No. 4938-A, describing its Roto-Wash Spray Booth has been issued by the Newcomb-Detroit Co., 5749 Russell, Detroit 11, Mich. Design and construction features of the spray booth are illustrated and described in the attractive bulletin and typical installations are pictured. Another section of the bulletin shows by means of installation photographs the development of the Newcomb-Detroit spray booth over a period of more than 20 years.

M.S.A. All-Vision Dust Mask, which provides complete facial and respiratory protection against nuisance and harmful dusts, is the subject of illustrated Bulletin No. CM-10, issued by the Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8, Pennsylvania.

Gray Metallic No. 7302 Finish for maximum mar-resistance plus eye appeal, which sprays on readily and bakes thoroughly at 250 deg. F. in 75 minutes, is the topic of a technical data sheet issued by Standard Varnish Works, 2600 Richmond Terrace, Staten Island 3, New York.

Oakite CrysCoat Process, a metal surface-preparation procedure designed primarily for application in pressure-spray washing machines, is the subject of a special folder prepared by Oakite Products, Inc., 20 Thames St., New York 6, N. Y. The folder describes features and advantages of the process, its method of preparation and its application, as a metal surface conditioner for use prior to painting.

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Outstanding

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3. **Resistance to oxidation**
4. **Resistance to perspiration**
5. **Resistance to abrasion**

Pale in color. Takes 100-200% reduction. Dries under 15 minutes.

A premium product—priced at ordinary lacquer levels.

The Varnish Products Company

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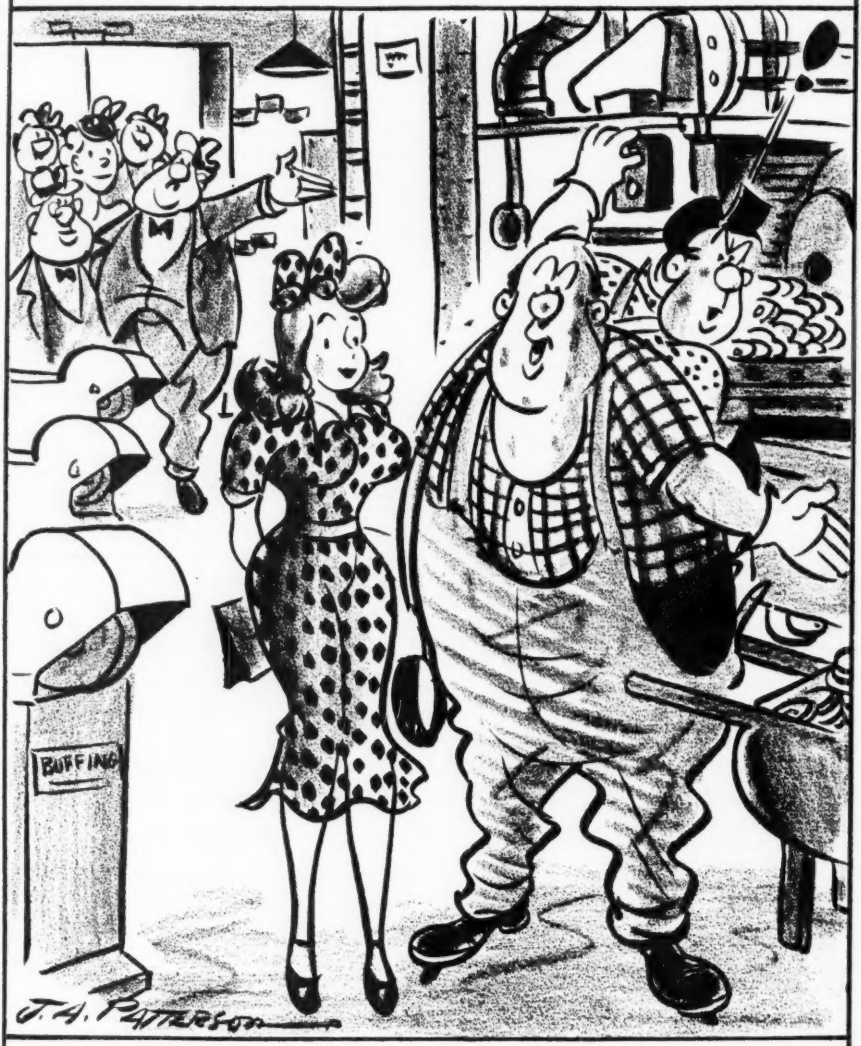
The Finishing Touch — **By J. A. Patterson**



"Oh, there's really nothin' to it, ma'am, or Gus here couldn't do it!"

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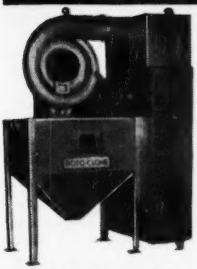

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Catalogs

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Clear Dip

Instructions outlining a simple dipping process for producing a clear, bluish coating directly on zinc die castings are available in Unichrome Dip Bulletin 12, published by United Chromium, Inc., New York 17, New York.

2. Precious Metal Plating

A 20-page booklet issued by A. Robinson & Son, New York 2, N. Y., presents in usable form accepted methods applied in the electroplating of such articles as watch cases, insignia, jewelry, novelties, pen and pencil parts.

3. Polishing Accessories

The Manderscheid Co., Chicago 7, Ill., has issued Bulletin 103 describing the Presto line of work holding spinners, tube polishing machines, emery troughs, wheel rakes, and other polishing room accessories.

4. Dust Collectors

Designated as the No. 31, a 24-page catalog illustrative and descriptive of its line of dust collectors and allied equipment for carrying away dust-laden air around grinding, cutting, and polishing wheels is now being distributed by the Torit Manufacturing Co., St. Paul 2, Minnesota.

5. Copper Anodes

A folder describing "Flat-Top" copper anodes may be obtained from Wagner Brothers Inc., Detroit 3, Michigan.

6. Strippable Plastic

Technical Data Bulletin No. T504, describing Copeel Strippable Plastic Coating, is being issued by the Maas & Waldstein Co., Newark 4, New Jersey.

7. Industrial Chemicals

A bulletin issued by the Harshaw Chemicals Co., Cleveland 6, Ohio, lists alphabetically the chemicals supplied by the company. Specific listings of chemicals supplied to industries such as electroplating, ceramics, scientific laboratories, and so on, are included.

8. Polishing Wheels and Belts

"Setting Up Metal Polishing Wheels and Belts" is the title of a 44-page handbook obtainable from the Norton Co., Worcester 6, Mass., which contains many worthwhile tips for increasing production and cutting polishing costs.

9. Polishing Machine

The Production Type S centerless polisher, buffer, and surfacer which easily handles work up to 1½ inches in diameter is discussed in detail in Bulletin PF-4, available from the Production Machine Co,. Greenfield, Massachusetts.

10. Polishing and Deburring Machinery

Hammond Machinery Builders, Inc., Kalamazoo 54, Mich., has issued Catalog No. 325 describing the flexible abrasive belt grinder-polishers, abrasive belt grinders, polishing and buffing lathes, wheel heads, backstands, and other machinery manufactured by the company.

11. Flock Color Card

A color card illustrating 20 stock shades of flock in rayon, cotton, and wool can be obtained from the Claremont Waste Mfg. Co., Claremont, New Hampshire.

12. Spray Finishing Equipment

Catalog No. 97 prepared by the Binks Manufacturing Co., Chicago 12, Ill., contains complete data on spray guns, spray booths, air compressors, painting outfits, extractors, respirators, hose, and other products.

13. Conveyor Belts and Wire Baskets

The complete Cambridge line of wire baskets, wire conveyor belts, metallic filter cloth, and other specialties is described in a booklet published by the Cambridge Wire Cloth Co., Dept. A, Cambridge 2, Maryland.

14. Cleaning Machinery

An illustrated folder descriptive of its complete line of machinery for washing, rinsing, and drying metal parts is now being offered by the Cincinnati Cleaning and Finishing Machinery Co., Ironton, Ohio.

15. Abrasive Belts

Thirteen production reports from various manufacturers citing advantages of Resinall Metalite Belts are contained in a folder issued by Behr-Manning, Troy, New York.

16. Metal Degreasing

The Chlorine Products Division, Electrochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del., has issued a 10-page illustrated booklet outlining standard practices for degreasing metals with chlorinated solvents.

17. Nickel Alloy Products

"Standard Specialties" is the title of a 24-page two-color catalog published by The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y., which lists approximately 200 standard products made of Monel, nickel, and Inconel for corrosive and high temperature service.

18. Hammer Finish

A technical data sheet published by the Standard Varnish Works, Staten Island 3, N. Y., describes Alpo-33A Hammer Finish.

19. Abrasive Grains

The Exolon Co., Tonawanda, N. Y., has issued a folder describing Exolon abrasive grains and polishing procedures applicable to various industry groups.

20. Metal Preparation

The Neilson Chemical Co., Detroit 7, Mich., has issued the following bulletins describing Neilson pre-paint treatments: Alumiprep, a surface treatment for aluminum; Prep-n-Cote, a cleaning and phosphate coating for steel or aluminum to be used in spray washing machines; Metalprep, a rust remover and metal cleaner for steel, aluminum, or galvanized iron.

21. Organic Finishing

A 12-page technical bulletin outlining basic points to be considered in the planning of a complete organic finishing system has been prepared by Peters-Dalton, Inc., Detroit 12, Mich.

22. Cleaners and Paint Strippers

Six technical bulletins describing paint strippers, cleaners, and phosphate coating materials are being distributed by Chemco Products Co., Inc., Chicago 19, Illinois.

23. A.C. Generators

A bulletin describing the construction and operation of Columbia alternating current generators is being issued by the Columbia Electric Manufacturing Co., Cleveland 14, Ohio.

24. Clear Lacquer

Stanley No. 45X-70 Clear Gloss Synthetic, a water-white coating for silver, or brass, chromium, steel, iron, magnesium, and zinc, is described in a data sheet available from The Stanley Chemical Co., East Berlin, Connecticut.

25. Abrasive Belt Head

Bulletin No. 17 issued by The Packer Machine Co., Meriden, Conn., describes Model No. 18 universal abrasive belt head and contains suggested applications of the device.

26. Finishing Equipment

The Despatch Oven Co., Minneapolis 14, Minn., has available Bulletin 51-E descriptive of its finishing systems.

27. Dust Collectors

A catalog describing types and models of Air Tumbler dust collectors and suppressors has been issued by the Dust Suppression & Engineering Co., Lake Orion, Mich. The action of the Air Tumblers in removing dust is described and data on unit size and capacity are included.

28. Cabinet Ovens

The Young Brothers Co., Detroit 7, Mich., has available Bulletin 8-S presenting information on electric, gas, or steam heated laboratory, standard, and special cabinet ovens.

29. Finishing Equipment

J. Holland & Sons, Inc., Brooklyn, N. Y., has published Folder "M" describing finishing equipment furnished by the company.

30. Troxide Bulletin

Troxide, dry acid salt compound for pickling prior to porcelain enameling, is described in a technical bulletin issued by MacDermid Inc., Waterbury 88, Connecticut.

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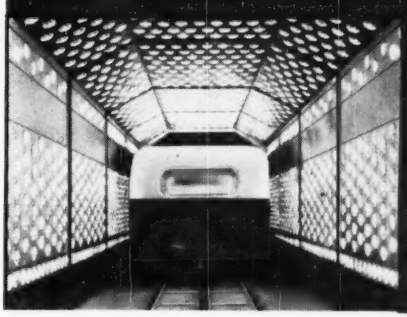
SIZE NO OBSTACLE for JENSEN Infra-Red Ovens



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